INSTALLATION RESTORATION PROGRAM TECHNICAL MEMORANDUM FOR FIELD INVESTIGATION AT IRP SITES NO. 1 AND NO. 2

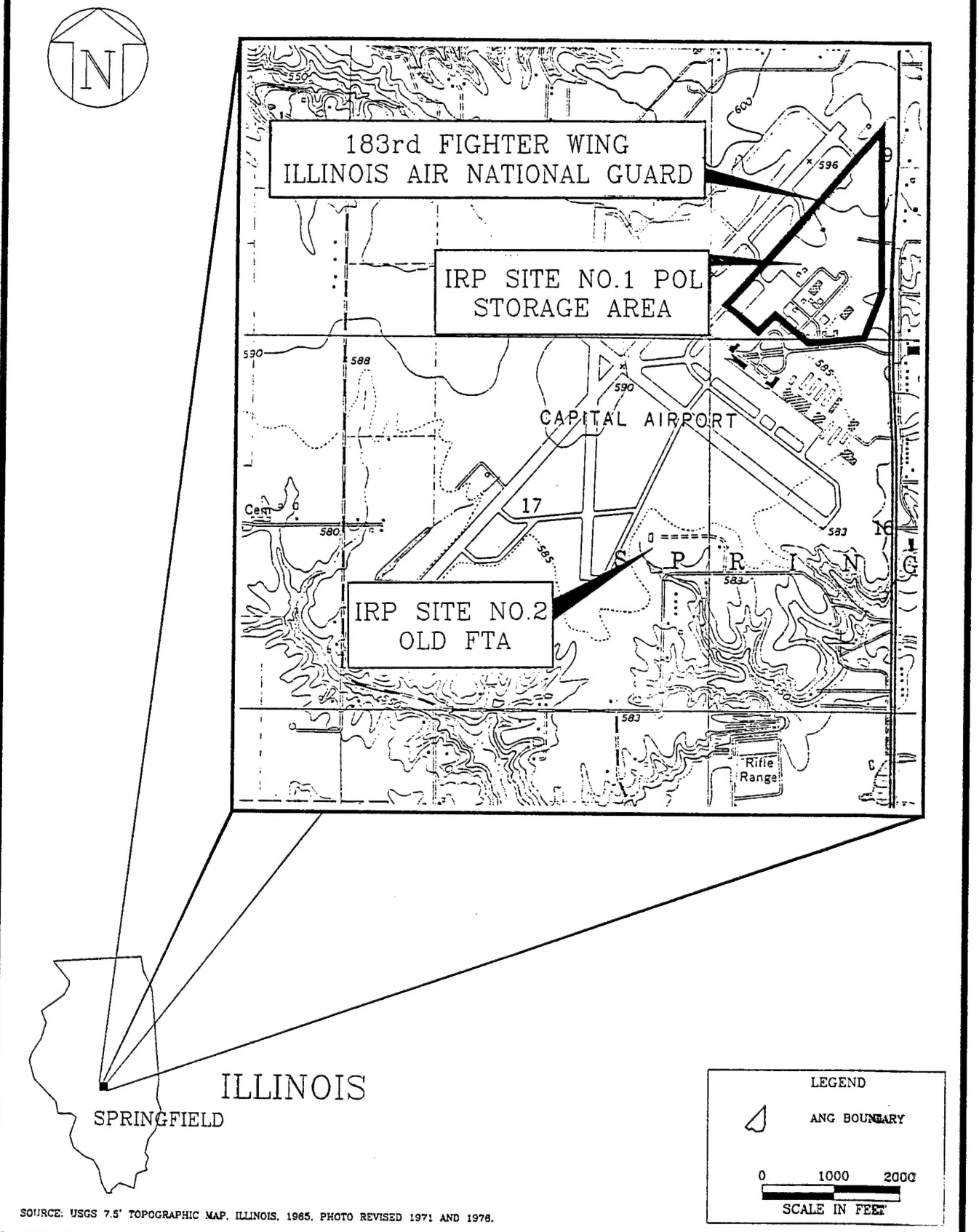
VOLUME I

183rd FIGHTER WING
ILLINOIS AIR NATIONAL GUARD
CAPITAL MUNICIPAL AIRPORT
SPRINGFIELD, ILLINOIS

AUGUST 1997

Prepared For

ANG/CEVR
ANDREWS AFB, MARYLAND



SOURCE: USGS 7.5' TOPOGRAPHIC MAP, ILLINOIS, 1965, PHOTO REVISED 1971 AND 1976.

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ILLINOIS\STATE

BASE LOCATION MAP

183rd FW, Illinois ANG
Springfield, Illinois

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The Installation Restoration Program was initiated by the Air National Guard (ANG) to evaluate potential contamination to the environment caused by past practices at its installations. Two sites were identified at Capital Municipal Airport during the 1990 Preliminary Assessment; the Petroleum, Oils and Lubricants Storage Area (Site 1) and the Old Fire Training Area (Site 2). Information gathered during a 1996 Site Investigation on both sites and 1995 Site Investigation Addendum for Site 2 did not provide adequate information for decision-making. This Field Investigation was designed to fill data gaps. The Tech Memo recommends Site 1 proceed to a No Further Action Decision Document, and Site 2 proceed to an Engineering Evaluation/Cost Analysis (EE/CA). No further field effort is necessary to complete the EE/CA. Vol 1 contains the main text of the report. Vol 2 contains the supporting data.

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LIST OF ACRONYMS

ANG/CEVR	Air National Guard Readiness Center Installation Restoration Program Branch
ARARs	Applicable or Relevant and Appropriate Requirements
ASTM	American Society of Testing Materials
BLS	Below land surface
BTEX	Benzene, toluene, ethylbenzene and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis-1,2-DCE	cis-1,2-Dichloroethene
cm/sec	centimeter per second
cm^2/sec	square centimeter per second
DCA	Dichloroethane
EE/CA	Engineering Evaluation/Cost Analysis
FTA	Fire Training Area
FW	Fighter Wing
GC	Gas Chromatography
HAZWRAP	Hazardous Waste Remedial Actions Program
HMTC	Hazardous Materials Technical Center
HSA	Hollow-stem auger
IEPA	Illinois Environmental Protection Agency
IRP	Installation Restoration Program
LUST	Leaking Underground Storage Tank
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MW	Monitoring well
NFADD	No Further Action Decision Document
OpTech	Operational Technologies Corporation
PA	Preliminary Assessment
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PID	Photoionization Detector
POL	Petroleum, Oils, and Lubricants
PPM	Priority Pollutant Metals
PRE	Preliminary Risk Evaluation
PZ	Piezometer
QA/QC	Quality Assurance/Quality Control
SAA	Springfield Airport Authority
SARA	Superfund Amendments and Reauthorization Act of 1986
SCITEK	Science and Technology, Incorporated

LIST OF ACRONYMS (Concluded)

SI	Site Investigation
SOV	Soil Organic Vapor
SVOC	Semivolatile Organic Compounds
TAL	Target Analyte List
TCE	Trichloroethene
TETC	The Earth Technology Corporation
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds

TECHNICAL MEMORANDUM FOR FIELD INVESTIGATION AT IRP SITES NO. 1 AND NO. 2

EXECUTIVE SUMMARY

This technical memorandum presents the results of the investigation activities conducted at Installation Restoration Program (IRP) Site No. 1, the Petroleum, Oils, and Lubricants Storage Area; and IRP Site No. 2, Old Fire Training Area, at the 183rd Fighter Wing, Illinois Air National Guard, Capital Municipal Airport, Springfield, Illinois (hereafter called the base). IRP Site No. 1 is located on the northwest side of the base, and IRP Site No. 2 is located on Springfield Airport Authority property on the south side of the airport.

After identifying IRP Sites No. 1 and No. 2 during a Preliminary Assessment conducted in 1990, site investigations were conducted at both sites. The overall objective of this field investigation was to obtain sufficient, accurate, and representative data to support risk-based decisions for both IRP Sites No. 1 and No. 2. This technical memorandum summarizes the status of the site characterization for IRP Sites No. 1 and No. 2, including results of both this field investigation and the previous site investigations. The conclusions and recommendations derived from these site investigations will result in either a Decision Document for no further action or an Engineering Evaluation/Cost Analysis, an investigative process and document which evaluates removal action alternatives for a site.

The field investigation at IRP Site No. 1 consisted of the collection of additional groundwater samples for chemical analyses. The field investigation at IRP Site No. 2 consisted of field activities designed to adequately characterize the nature and extent of contamination. This additional analytical data, in combination with analytical and hydrogeological data gathered in the previous investigations, will be incorporated into a site risk evaluation to support decisions at the site.

IRP SITE NO. 1 - PETROLEUM, OILS, AND LUBRICANTS STORAGE AREA

IRP Site No. 1, the Petroleum, Oils, and Lubricants Storage Area, previously contained four 25,000-gallon JP-4 fuel (a grade of jet fuel) underground storage tanks. A spill occurred in the area sometime between 1958 and 1959 when a fuel transfer pump leaked approximately 3,100 gallons of JP-4 onto the ground.

Due to the surrounding land use, IRP Site No. 1 is classified as an industrial/commercial site. The groundwater is classified as Class I, Potable Resource Groundwater, or that which is fit for human consumption (the most stringent state groundwater standard) (Section 620.210, Title 35, Part 620, Groundwater Quality, Illinois Environmental Protection Agency, 1996).

Based on both this field investigation and the results of previous investigations at the site, conclusions for IRP Site No. 1 are as follows:

- Fuel-related compounds are present in soil samples at levels below the Illinois Environmental Protection Agency risk-based soil cleanup objectives for industrial and commercial properties. Risk-based soil cleanup objectives have been developed to adequately protect human health and the environment while incorporating site-specific information to allow for more cost-effective remedial action. These risk-based objectives incorporate a "tiered" approach whereby remediation efforts are focused on site-specific information pertaining to the threat to human health and the environment.

- Metals are present in soil samples within the normal range of concentrations in local soils. These naturally occurring, or background soil, soil concentrations provide a baseline for comparison of analyses collected at sites of suspected contamination. Background concentrations are determined by collection and analysis of soil samples in a relatively pristine area of no suspected contamination.

- Fuel-related compounds are present in the groundwater samples collected from monitoring well MW104 at concentrations below the Illinois Environmental Protection Agency risk-based groundwater cleanup objective for Class I groundwater. Monitoring well MW104 is located directly downgradient (or "downstream") from the former underground storage tanks at the site. Fuel-related compounds are not present in the groundwater samples collected from monitoring well MW101, which is located downgradient from monitoring well MW104.

The recommendation for IRP Site No. 1 is as follows:

- No additional investigation is warranted at the site. It is recommended that a no further action Decision Document be prepared for IRP Site No. 1.

IRP SITE NO. 2 - OLD FIRE TRAINING AREA

IRP Site No. 2, Old Fire Training Area, was utilized by the 183rd Fighter Wing, Springfield Airport Authority, and city personnel in fire-training exercises. Fire-training exercises were conducted at the area approximately twice a month during the years 1949 to 1974, when 200 to 300 gallons of flammable liquids were reportedly poured on the ground and ignited. Jet fuels (JP-2, JP-3, and JP-4), paints, paint strippers, solvents, and other flammables from various base shops were reportedly also burned at the old fire training area.

IRP Site No. 2, located on Springfield Airport Authority property in an area inaccessible to the public, is classified as an industrial/commercial site. The groundwater is classified as Class I, Potable Resource Groundwater. The Springfield Airport Authority purchased all but one of the residential properties near the site. For the property on the corner of the road, the owner was unwilling to sell. All private wells in this area have been abandon with the exception of the private well on the unpurchased property; however, this well is not being used by the resident. All residences in this adjacent area are connected to the municipal water system. With the exception of one private water well, which is not used as a potable water supply, all adjacent private wells have been abandoned.

Based on this field investigation and the results of previous investigations at the site, conclusions for IRP Site No. 2 are as follows:

- Vinyl chloride and cis-1,2-dichloroethene (compounds related to solvent use) were found in groundwater samples collected from monitoring wells MW202 and MW202B at concentrations exceeding the Illinois Environmental Protection Agency's risk-based groundwater cleanup objectives for Class I groundwater. Monitoring wells MW202 and MW202B are clustered monitoring wells (close-together wells that are screened at different depths) that are located directly downgradient from the old fire training area.

- No site-related compounds were found in groundwater samples collected from the clustered monitoring wells (MW201 and MW201B), located approximately downgradient from MW202, at concentrations below the Illinois Environmental Protection Agency's risk-based groundwater cleanup objectives for Class I groundwater.

- Surface water and sediment samples were collected from the first and second ponds which are located downgradient from monitoring wells MW202 and MW202B. No site-related compounds were found in these samples.

The recommendation for IRP Site No. 2 is as follows:

- It is recommended that an Engineering Evaluation/Cost Analysis be conducted for the site. The resulting risk-based evaluation will determine the necessity for removal action for both soil and groundwater based on environmental conditions at IRP Site No. 2.

INSTALLATION RESTORATION PROGRAM
TECHNICAL MEMORANDUM
FOR FIELD INVESTIGATION
AT IRP SITES NO. 1 AND NO. 2

SECTION 1.0 INTRODUCTION

This Technical Memorandum presents the results of the investigation activities conducted at Installation Restoration Program (IRP) Site No. 1, the Petroleum, Oils, and Lubricants (POL) Storage Area, and IRP Site No. 2, Old Fire Training Area (FTA), at the 183rd Fighter Wing (FW), Illinois Air National Guard, Capital Municipal Airport, Springfield, Illinois (hereafter called the base). IRP Site No. 1 is located on the northwest side of the base and IRP Site No. 2 is located on Springfield Airport Authority (SAA) property on the south side of the airport (Figure 1.1).

The Air National Guard Readiness Center Installation Restoration Program Branch (ANG/CEVR) contracted with Operational Technologies Corporation (OpTech) to conduct the field investigation and prepare a Technical Memorandum for the Engineering Evaluation/Cost Analysis (EE/CA) for IRP Sites No. 1 and No. 2. The EE/CA was conducted under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986.

1.1 FIELD INVESTIGATION OBJECTIVES

The overall objective of this field investigation is to obtain sufficient, accurate, and representative data to support a risk-based decision for IRP Sites No. 1 and No. 2. The status of the site characterization for IRP Sites No. 1 and No. 2 is summarized in this Technical Memorandum.

1.2 PURPOSE OF TECHNICAL MEMORANDUM

The data obtained during the investigation is evaluated based on Illinois Environmental Protection Agency (IEPA) risk-based soil and groundwater cleanup objectives. These risk-based cleanup objectives incorporate a "tiered" approach whereby remediation efforts are focused on site-specific information pertaining to potential threats to human health and the environment. The evaluation of data will result in decisions to conduct no further action or to conduct an EE/CA, non-time-critical removal action (i.e., where the release poses no immediate threat to public health, welfare, or the environment).

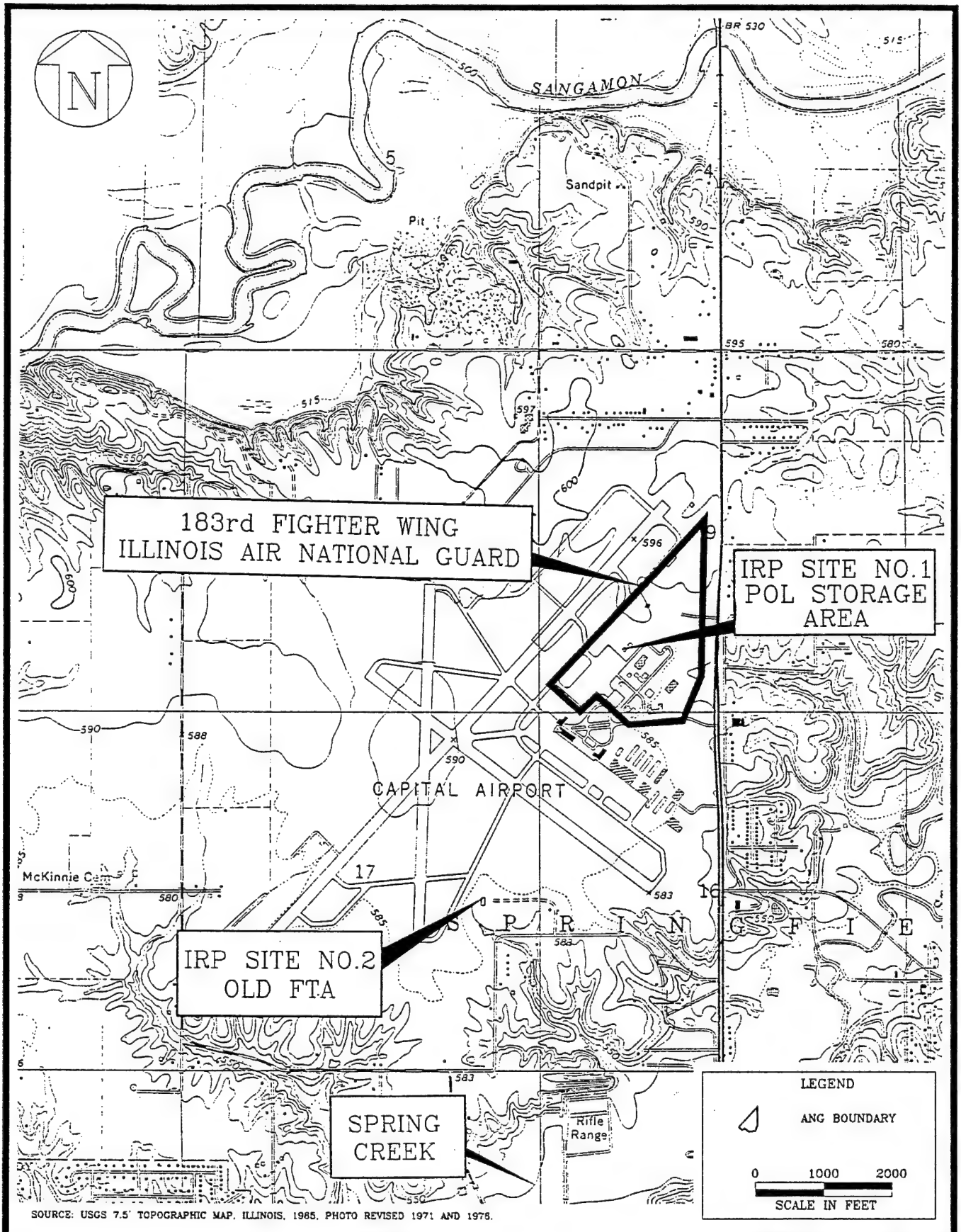

FIGURE 1.1

SITE LOCATION MAP
183rd FW, Illinois ANG
Springfield, Illinois

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AUGUST 1997

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1.3 TECHNICAL MEMORANDUM ORGANIZATION

The Technical Memorandum is organized into an executive summary, eight sections, and nine appendices (A through I).

Executive Summary — Summarizes the investigations conducted at the sites, the significant findings, and the recommendations.

Section 1.0 — **Introduction**, provides the purpose and context of the technical memorandum.

Section 2.0 — **Site Background Information**, provides a description and history of IRP Sites No. 1 and No. 2, including previous investigative results.

Section 3.0 — **Environmental Setting**, provides a summary of the base's environmental setting, including its physiography, climate, demography, geology, hydrology, water quality, and water use.

Section 4.0 — **Field Program**, describes the field investigation conducted at IRP Sites No. 1 and No. 2.

Section 5.0 — **Investigation Findings**, presents the results of the geologic, hydrogeologic, and chemical analysis investigations. These results adequately define the nature and extent of the contamination, and whether contaminants are present at concentrations exceeding the IEPA regulations (IEPA, 1996) or Applicable or Relevant and Appropriate Requirements (ARARs). ARARs are those federal, state and local regulations or requirements which govern specific actions during any environmental investigation. This section also includes an assessment of the analytical data from both the current investigation and previous investigations, including a comparison of the analytical results with ARARs.

Section 6.0 — **Conclusions**, provides a risk-based assessment of these cumulative investigations.

Section 7.0 **Recommendations**, presents recommendations based on the risk-based assessments of the sites.

Section 8.0 **References**, presents references used in the preparation of this document.

APPENDIX A through APPENDIX J

Contains detailed documentation of this field investigation, including field data analyses and interpretation, chemical analyses, survey data, and quality assurance documentation.

SECTION 2.0 SITE BACKGROUND INFORMATION

This section presents a description and history of IRP Sites No. 1 and No. 2 and a summary of the previous investigations of these sites. The description and history of these sites are presented in Section 2.1. The results of the previous investigations for these sites are summarized in Section 2.2.

2.1 SITE DESCRIPTION AND HISTORY

2.1.1 IRP Site No. 1 — Petroleum, Oils, and Lubricants Storage Area

IRP Site No. 1, the POL Storage Area, is located on the northwest side of the base (Figure 1.1). The area previously contained four 25,000-gallon JP-4 fuel (a grade of jet fuel) underground storage tanks (USTs). A spill occurred at the POL storage area sometime during 1958 and 1959 when a fuel transfer pump leaked approximately 3,100 gallons of JP-4 onto the ground. The base fire department was called to clean up the spill, but very little fuel was recovered. The fuel was covered with foam to prevent a fire and washed with water to a storm drain located across from the transfer pumps. The storm drain ultimately discharges into a tributary east of the base. It was reported that some fuel soaked into the ground surrounding the POL facility.

IRP Site No. 1 is classified as an industrial/commercial site due to its location and the surrounding land use. The groundwater is within the unconsolidated glacial deposits overlying the bedrock and this hydrologic unit has an average hydraulic conductivity greater than 1×10^{-4} centimeters/second (cm/sec) (TETC, 1996). Thus, the groundwater is classified as Class I, Potable Resource Groundwater, or that which is fit for human consumption (Section 620.210, Title 35, Part 620, Groundwater Quality, IEPA, 1996). The base, as well as nearby residents, are connected to the municipal water system for drinking water.

2.1.2 IRP Site No. 2 — Old Fire Training Area

IRP Site No. 2, Old FTA, is located on SAA property east of the approach end of Runway 36 and approximately 120 feet north of a small pond and intermittent stream on the south side of the airport (Figure 1.1). There is currently no visible evidence of the FTA on the land surface. Examination of aerial photographs from 1956 and 1982 indicate that subsurface remains of the FTA would be expected in the grassy area near a concrete parking apron. Fire-training exercises were conducted at the old FTA approximately twice a month during the years 1949 to 1974, when 200 to 300 gallons of flammable liquids were reportedly poured on the ground and ignited. These liquids may have included jet fuels (JP-2, JP-3, and JP-4), paints, paint strippers, solvents, and other flammables from various

base shops. The site was utilized by the 183rd FW, SAA and city personnel in these fire-training exercises.

IRP Site No. 2, located on SAA property, is also classified as an industrial/commercial site. The site is in a secure area not accessible to the public. The groundwater is within the unconsolidated glacial deposits overlying the bedrock and this hydrologic unit has an average hydraulic conductivity greater than 1 X 10^{-4} cm/sec (TETC, 1996). Thus, the groundwater is classified as Class I, Potable Resource Groundwater (Section 620.210, Title 35, Part 620, Groundwater Quality, IEPA, 1996). The SAA purchased all of the residential properties near the site, with the exception of the property at the corner of the road. The owner was unwilling to sell. All private wells in this area have been abandoned with the exception of the private well on the unpurchased property; however, this well is not being used by the resident. All residences in this adjacent area are connected to the municipal water system.

2.2 PREVIOUS INVESTIGATIONS

A Preliminary Assessment (PA) conducted in 1990 identified IRP Sites No. 1 and No. 2 as potential areas of contamination (SCITEK, 1990). Investigations implemented under the IRP process for these sites are summarized in the following subsections.

2.2.1 IRP Site No. 1 — Petroleum, Oils, and Lubricants Storage Area

In February 1991, a soil organic vapor (SOV) survey was completed at IRP Site No. 1. Based on the results of the SOV survey, JP-4 contamination of the soil and groundwater was probable, and collection of soil and groundwater samples was recommended.

A Site Investigation (SI) was conducted in 1992 and 1993, and included:

- screening soil samples at five locations;
- screening a groundwater sample at one location;
- drilling eight soil borings for collection of soil samples;
- collecting surface-soil samples at two locations;
- installing four piezometers for collection of hydrologic data; and
- installing four monitoring wells for collection of two rounds of groundwater samples and hydrologic data.

Seventeen surface- and subsurface-soil samples, and eight groundwater samples (two rounds of sampling from the monitoring wells), were collected for chemical analyses. The sampling locations are

presented in Figure 2.1. The soil and groundwater samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and lead.

Polynuclear aromatic hydrocarbons (PAHs) were present in the surface- and subsurface-soil samples at levels above the Illinois Leaking Underground Storage Tank (LUST) Type A soil cleanup objectives (TETC, 1996). However, levels did not exceed the IEPA risk-based soil cleanup objectives for industrial and commercial properties (Title 35, Part 742, IEPA, 1996).

Fuel-related compounds were present in the groundwater samples collected from monitoring well MW104 at concentrations below the IEPA risk-based groundwater cleanup objectives for Class I groundwater (Title 35, Part 742, Tier I, IEPA, 1996). Lead was found in the groundwater sample collected from MW103 at a concentration of 9.4 micrograms per liter (µg/L), exceeding the cleanup objective for Class I (7.5 µg/L) but less than the objective for Class II (100 µg/L) groundwater.

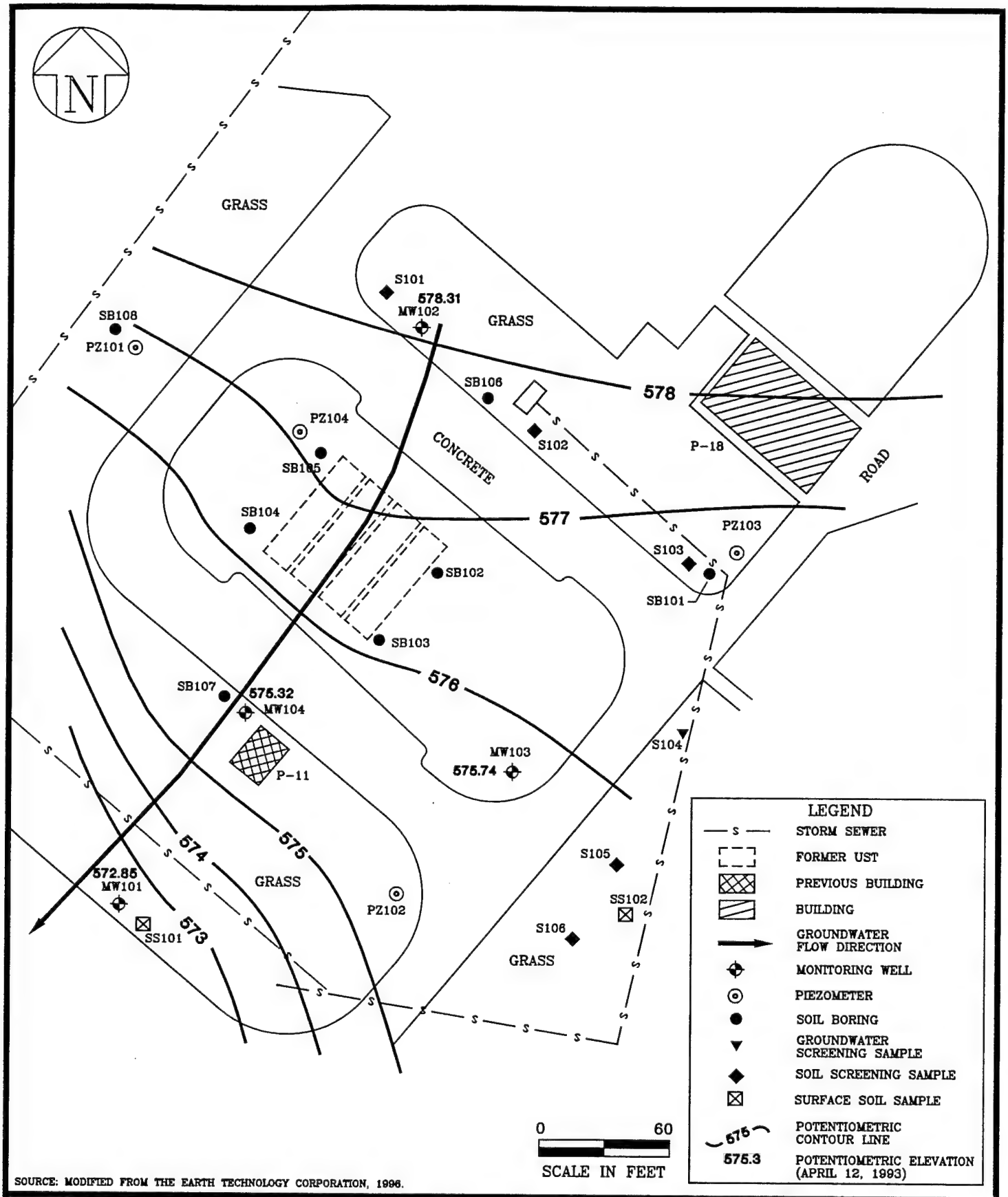
The preliminary risk evaluation (PRE) indicated there was no immediate endangerment to human health or the environment.

2.2.2 IRP Site No. 2 — Old Fire Training Area

An SI was conducted in 1992 and 1993 and included:

- collecting SOV and grab-type soil and groundwater samples for screening site-related contaminants;
- drilling seven soil borings for collection of soil samples;
- collecting surface-soil samples from two locations;
- installing three piezometers for collection of hydrologic data;
- installing three monitoring wells for collection of two rounds of groundwater samples and hydrologic data; and
- collecting three sediment and surface-water samples from the pond located at IRP Site No. 2.

The results of the screening activities are presented in Figure 2.2. Seventeen surface- and subsurface-soil samples, six groundwater samples (two rounds of sampling from the monitoring wells), and three sediment and surface-water samples were collected for chemical analyses. These sampling locations are presented in Figure 2.3. The soil, groundwater, sediment, and surface-water samples were analyzed for VOCs, SVOCs, polychlorinated biphenyls (PCBs) and pesticides, and target analyte list (TAL) metals. The analytes that exceeded the ARARs or IEPA cleanup objectives are presented in Figure 2.3.



SOURCE: MODIFIED FROM THE EARTH TECHNOLOGY CORPORATION, 1996.

FIGURE 2.1

ILLINOIS\TM-269\SITE1-A

SI SAMPLING LOCATIONS AT IRP SITE NO.1, POL STORAGE AREA

183rd FW, Illinois ANG
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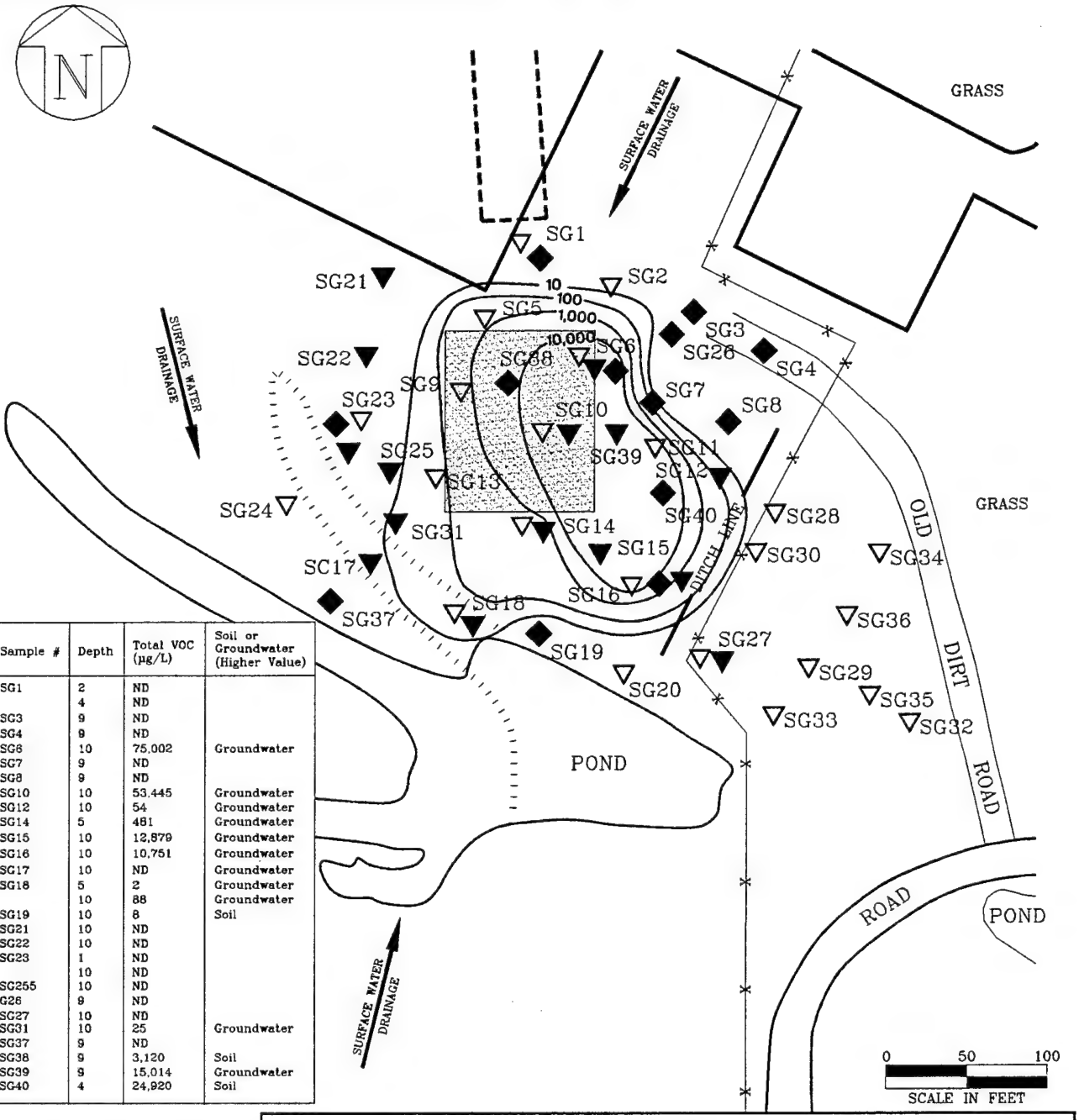

Sample #	Depth	Total VOC (µg/L)	Soil or Groundwater (Higher Value)
SG1	2	ND	
	4	ND	
SG3	9	ND	
SG4	9	ND	
SG6	10	75,002	Groundwater
SG7	9	ND	
SG8	9	ND	
SG10	10	53,445	Groundwater
SG12	10	54	Groundwater
SG14	5	481	Groundwater
SG15	10	12,879	Groundwater
SG16	10	10,751	Groundwater
SG17	10	ND	Groundwater
SG18	5	2	Groundwater
	10	88	Groundwater
SG19	10	8	Soil
SG21	10	ND	
SG22	10	ND	
SG23	1	ND	
	10	ND	
SG255	10	ND	
G26	9	ND	
SG27	10	ND	
SG31	10	25	Groundwater
SG37	9	ND	
SG38	9	3,120	Soil
SG39	9	15,014	Groundwater
SG40	4	24,920	Soil

LEGEND

- PREVIOUS BUILDING
- FENCE
- ESTIMATED LOCATION OF SITE NO.2
- PREVIOUS POND LINE
- SOV SOIL ORGANIC VAPOR
- µg/L MICROGRAMS PER LITER
- SOIL SCREENING SAMPLE LOCATION
- GROUNDWATER SCREENING SAMPLE
- SOIL ORGANIC VAPOR SAMPLE LOCATION
- 10 TVOC SOIL AND GROUNDWATER SCREENING RESULTS CONTOUR (µg/L)

SOURCE: MODIFIED FROM THE EARTH TECNOLOGY CORPORATION, 1996.

FIGURE 2.2

ILLINOIS\TN-269\ILLI-2

SITE NO.2 SI SOV, GRAB-TYPE SOIL AND GROUNDWATER SCREENING RESULTS – TOTAL VOCs
183rd FW, Illinois ANG
Springfield, Illinois

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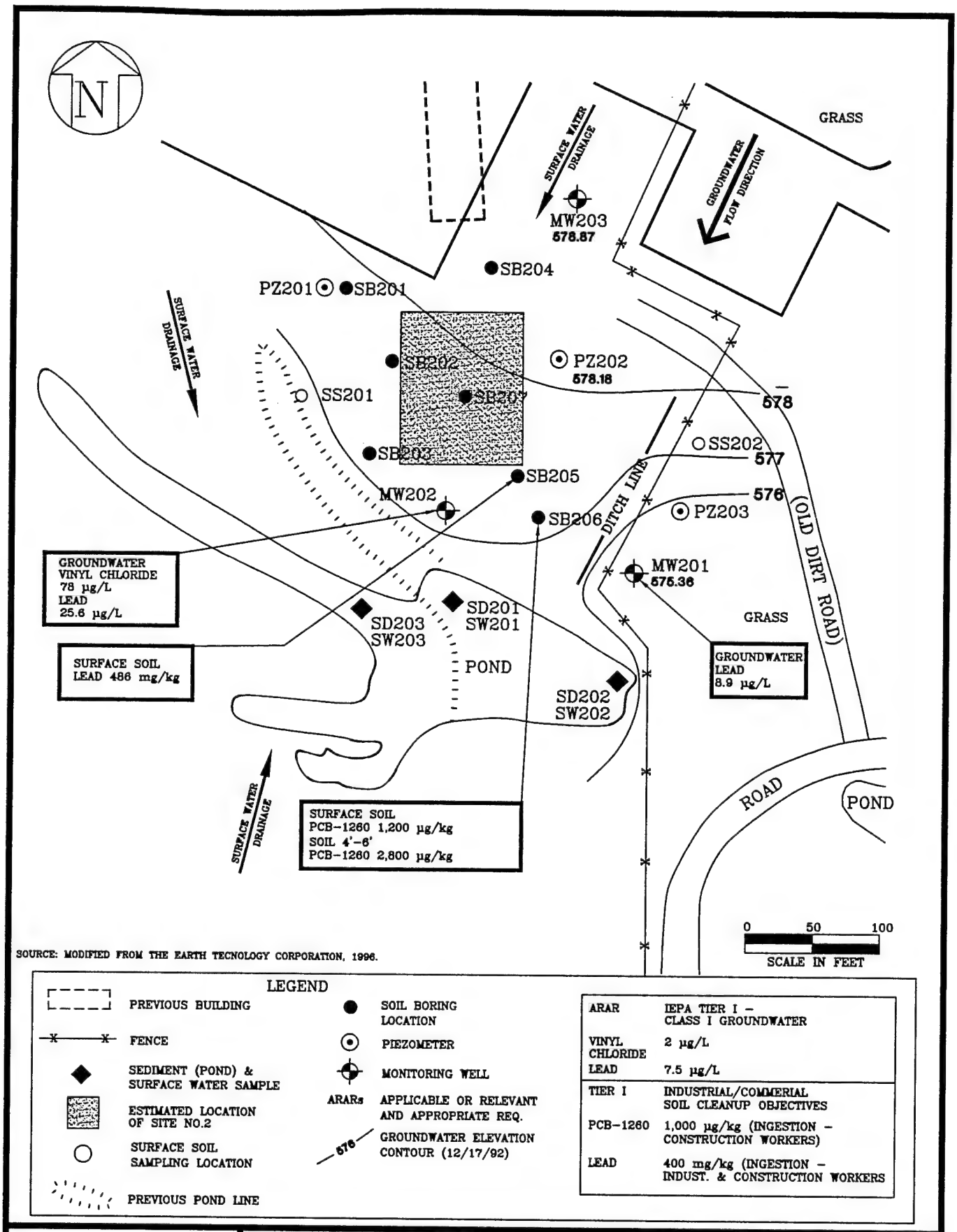

FIGURE 2.3

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SI SAMPLING LOCATIONS AND ANALYTES EXCEEDING ARARs AT IRP SITE NO.2, OLD FTA
183rd FW, Illinois ANG
Springfield, Illinois

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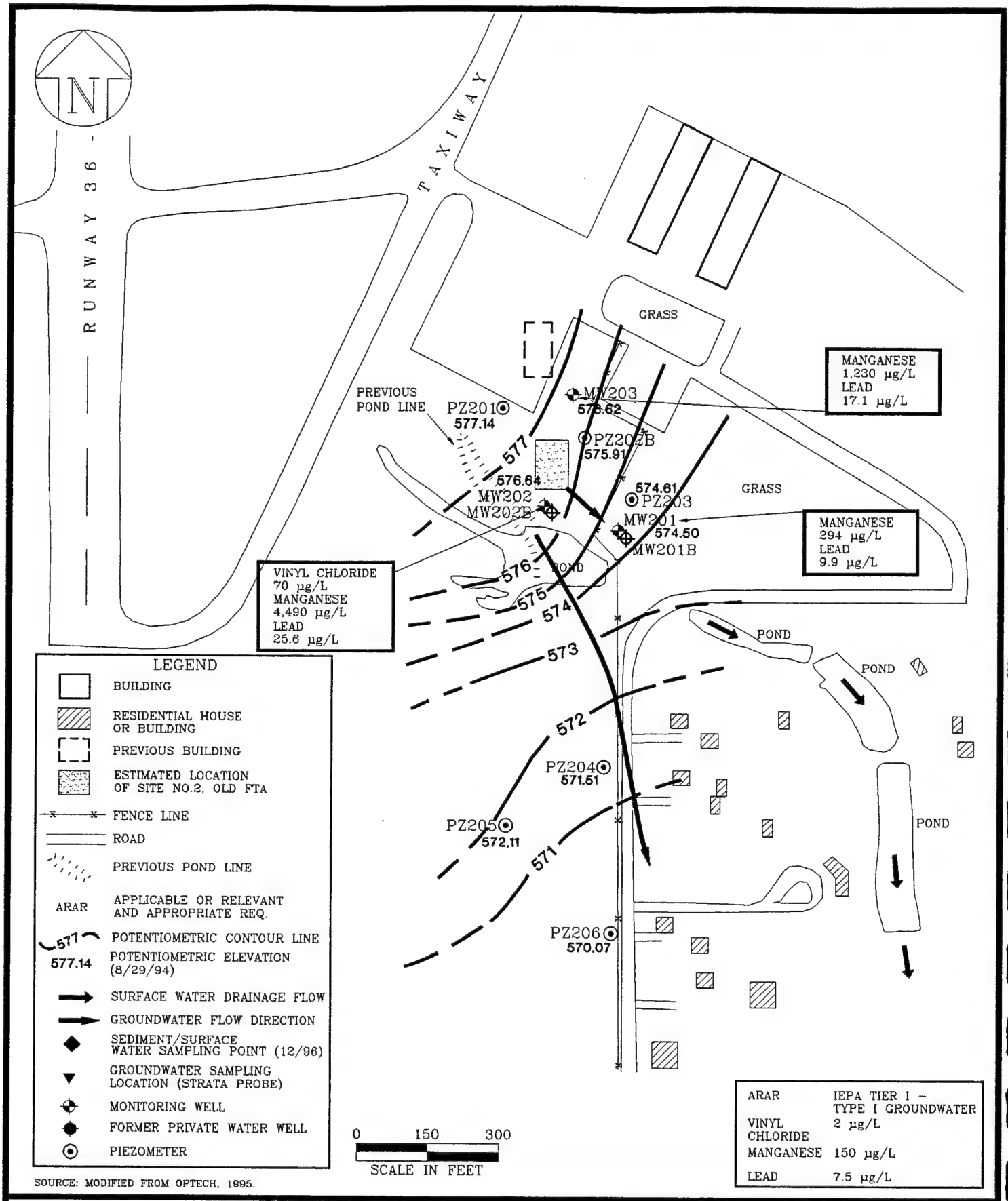
The results of the SI confirmed that soil and groundwater contamination, related to the past fire-training exercises, existed at the site. VOCs, SVOCs, pesticides/PCBs, and metals were found in the soil and sediment samples collected during the SI. Concentrations of VOCs and SVOCs did not exceed the IEPA cleanup objectives for soil on an industrial/commercial property. PCB-1260 was present in the surface- and subsurface-soil (4 - 6 foot interval) samples collected from location SB206 at concentrations exceeding the IEPA cleanup objective for ingestion to construction workers (Tier I). The concentration of lead found in a surface-soil sample collected from location SB205 exceeded the IEPA cleanup objective for ingestion (Tier I). VOCs and metals were present in the groundwater samples collected during the SI. Vinyl chloride and lead were found in the groundwater sample collected from MW202 at concentrations exceeding the IEPA risk-based groundwater cleanup objectives for Class I groundwater (Tier I). Lead was also present in the groundwater sample collected from MW201 at a concentration exceeding the IEPA risk-based groundwater cleanup objective for Class I groundwater (Tier I).

At the time of the SI, residences located southeast and downgradient of IRP Site No. 2 utilized domestic water wells for their potable water supplies. The SI concluded that, based on the surface topography and shallow groundwater flow regime that was assumed to exist beneath the pond near the site, contaminants may have migrated off airport property to the residential area to the southeast. Immediate actions were taken to provide alternative water sources for the residents in the area while evaluating whether contaminants from IRP Site No. 2 were migrating off-site. Groundwater samples were collected from nine domestic water wells in the summer of 1993 and in November 1993 (HAZWRAP, 1994). 1,1-Dichlorethene (1,1-DCE) and 1,1,1-trichloroethane (1,1,1-TCA) were present in the groundwater sample collected from one private well (PW4), at concentrations of 92 µg/L and 780 µg/L, respectively, exceeding IEPA risk-based groundwater objectives for residential property and Class I groundwater. Residents were placed on the city water supply system in November 1993, and the water wells were abandoned in the spring of 1994. All residential properties were purchased by SAA except the residential property that contained private well PW6. These residential properties are currently leased to private individuals by the SAA.

Additional SI fieldwork was conducted in August 1994 to evaluate whether the site-related contaminants were migrating off-site. These data were published in an SI Addendum (OpTech, 1995). The field investigation consisted of collection of groundwater samples from both Strataprobe™ sampling locations (for screening contaminants) and from the three existing monitoring wells (for chemical analyses), and the installation of three piezometers for screening contaminants and collecting hydrologic data. The Strataprobe™ sampling locations and piezometers are located south to southeast of the pond and downgradient of the site. The sampling locations are presented in Figure 2.4. Groundwater samples that were collected from the Strataprobe™ sampling locations were analyzed for



SOURCE: MODIFIED FROM OPTECH, 1995.

FIGURE 2.4

ILLINOIS\TM-269\MAIN-4

SI ADDENDUM – ANALYTES EXCEEDING ARARs AT IRP SITE NO.2, OLD FTA

183rd FW, Illinois ANG
Springfield, Illinois

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VOCs (U. S. Environmental Protection Agency (USEPA) modified Method SW846-8021) by an on-site laboratory. Groundwater samples that were collected from the existing monitoring wells were analyzed for the same analytes and by the same methods used for the SI. The analytes that exceeded the ARARs or IEPA cleanup objectives are presented in Figure 2.4.

Based on the screening results of the groundwater samples collected downgradient of the site, no target analytes were present above IEPA risk-based objectives. Vinyl chloride was found in the groundwater samples collected from MW202 at concentrations exceeding the IEPA risk-based groundwater cleanup objective for Class I groundwater (Tier I). Manganese and lead were present in groundwater samples collected from MW201, MW202, and MW203 at concentrations exceeding the IEPA risk-based groundwater cleanup objective for Class I groundwater (Tier I). However, the SI Addendum concluded that IRP Site No. 2 was not the source of contamination found in the groundwater sample collected from the private well downgradient of the site (OpTech, 1995). To further fortify this conclusion, a recommendation was made to conduct an additional round of groundwater sampling at IRP Site No. 2.

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SECTION 3.0 ENVIRONMENTAL SETTING

The base is located on the northeast portion of the Capital Municipal Airport property approximately two miles northwest of Springfield, Illinois. Average annual temperature in Springfield, Illinois, is 53 degrees Fahrenheit (° F), with summer temperatures averaging in the high 70s and winter temperatures averaging in the mid-20s. Average annual precipitation is 33.78 inches. Land use surrounding the base is residential and commercial, with agricultural land to the south and northwest of the airport.

Physiographically, the 183rd FW, is located within the Illinois Basin west of the La Salle Anticlinal Belt and East of the Athens Valley Fill (Bergstrom et al., 1976). Athens Valley, an ancient valley caused by glaciation and glacial runoff, is now filled with Pleistocene-aged deposits and glacial drift (TETC, 1996). Pleistocene glacial drift, loess, and alluvium overlie the Pennsylvanian McLeansboro Group (Figures 3.1 and 3.2), which consists of the Mattoon, Bond, and Modesto Formations (Bergstrom et al., 1976). The base and the airport are situated on a mature dissected plateau with a maximum relief of 15 feet. Bedrock is located approximately 30 feet below land surface (BLS).

Based on previous investigations, the subsurface soils are similar between IRP Sites No. 1 and No. 2 (TETC, 1996). Fill material or reworked native soil was found in the upper few feet of a majority of the soil borings. The fill material, which ranges in thickness from 0 to 6 feet BLS, consists of the native clay soils with the presence of man-made objects (brick fragments, nails, etc.) or the occurrence of gravel. The native soil in the near-surface soil consists of dark brown to brown, organic-rich clays with variable amounts of silt and fine-grained sand. The surficial clay unit is underlain by a silty clay or silt unit, occurring at depths ranging from 4.5 to 8.5 feet BLS. The silt unit consists of a grey-brown to light-brown silt with minor amounts of sand and clay. A lower clay unit of stiffer consistency, which underlies the silt unit, was observed below approximately 15 feet BLS. A sand and/or gravelly clay unit, approximately 2.5 feet thick, was encountered prior to auger refusal (approximately 21.5 to 26 feet BLS). This unit is a weathered shale which is probably representative of the weathered remains of the Pennsylvania-aged bedrock (Bergstorm et al., 1976). This unit may be equivalent to the "hard pan" described by local water well drillers (TETC, 1996). Based on boring logs of monitoring wells MW201B and MW202B, the unconsolidated glacial material consists of reworked loess (silt deposited by wind) that is approximately 15 feet thick overlying a glacial till deposit (a combination of silt, clay, sand, and gravel deposited directly by the glacier) that is approximately 10 feet thick. The total thickness of the unconsolidated glacial material overlying the bedrock is 25 feet.

Time-stratigraphic units		Rock-stratigraphic units			Average thickness of formation (ft)	Description
System	Series	Group/Stage	Formation	Selected Members		
Quaternary	Pleistocene	Holocene	Cahokia Alluvium			
		Wisconsinan	Richland Loess			
			Parkland Sand			
			Peoria Loess			
			Wedron Formation			
			Henry Formation			
			Robein Silt			
			Roxana Silt			
			Sangamon Soil			
		Illinoian	Taneriffe Silt			
			Glasford Formation	Radnor Till		
				Vandalia Till		
				Undifferentiated Till		
		Kansan	Banner Formation	Undifferentiated Till		
			Mohonet Sand			
						Unconformity
Pennsylvanian	Missourian	McLeansboro	Mattoon		100+	
			Bond	Millersville Limestone	200	
				Shoal Creek Limestone		
	Desmoinesian		Modesto	Chapel (No.8) Coal	250	
				Trivoli Sandstone		
				Lonsdale Limestone		
		Kewanee	Carbondale	Danville (No.7) Coal	225	Shales, siltstones sandstones, and thin limestones claystones, and coals
				Brereton Limestone		
				Herrin (No.6) Coal		
				St. David Limestone		
				Springfield (No.5) Coal		
				Summon (No.4) Coal		
				Colchester (No.2) Coal		
			Spoon	Litchfield Coal	150	
	Atokan	McCormick	Abbott		150	

SOURCE: BERGSTROM ET AL, 1976

FIGURE 3.1

ILLINOIS\STRATI

GENERALIZED STRATIGRAPHIC SECTION OF ILLINOIS

183rd FW, Illinois ANG
Springfield, Illinois

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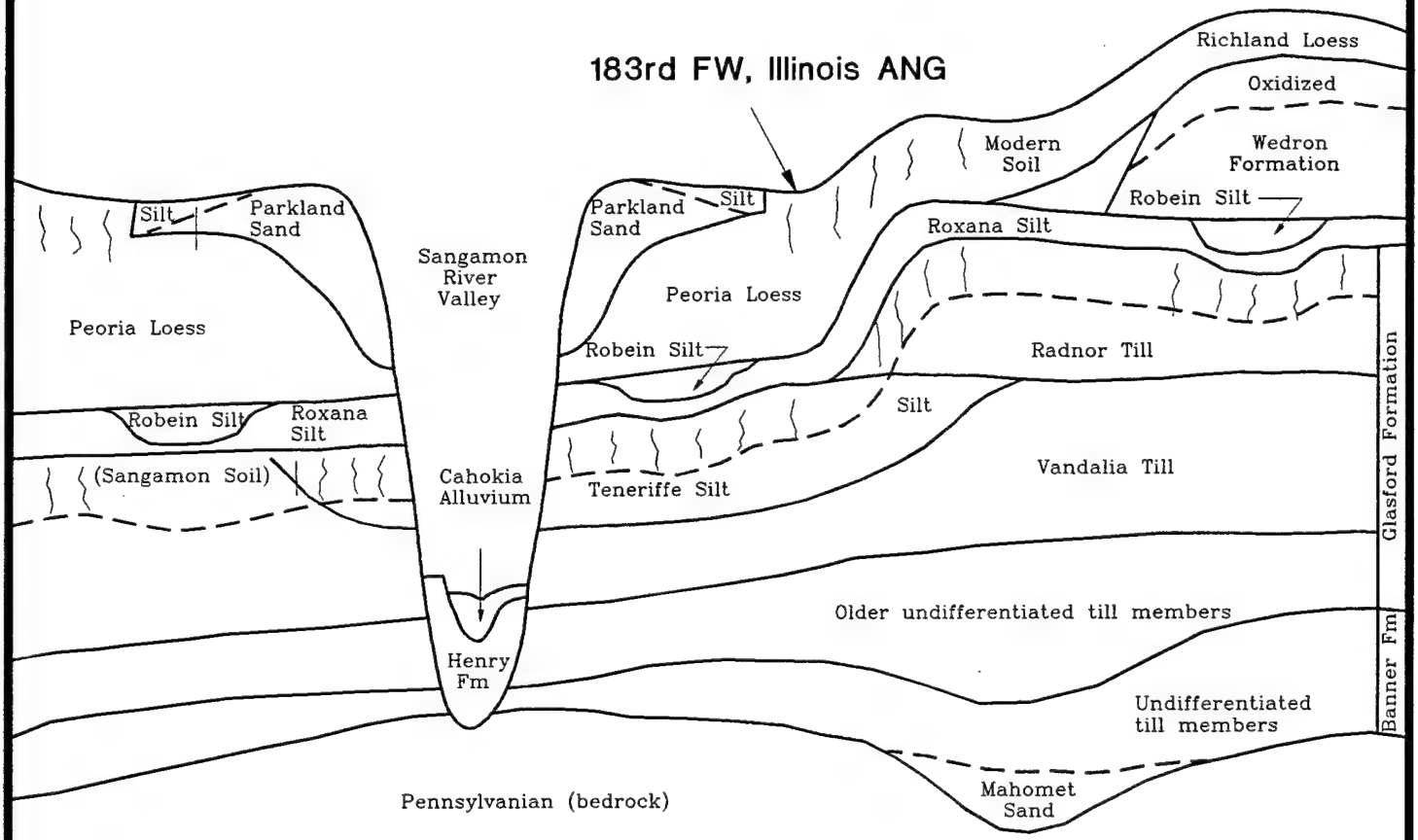

SOURCE: BERGSTROM ET AL. 1976.

FIGURE 3.2

ILLINOIS\GEN-CROS

GENERALIZED CROSS-SECTION OF THE UNCONSOLIDATED SEDIMENTS AT THE BASE AND VICINITY
183rd FW, Illinois ANG
Springfield, Illinois

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The main surface water drainage features surrounding the base are the Sangamon River to the north and Spring Creek on the south and east sides of the base (Figure 1.1). The base is not within the 100-year floodplain. In the Spring Creek drainage, there are several small, standing ponds close to the base. The largest pond is associated with the municipal sewage treatment plant located to the east of the base. This plant receives sewage from the base and the Capital Municipal Airport complex. Several other small ponds are located around the airport to catch runoff, and the water is stored for agricultural purposes (SCITEK, 1990).

The nearest large body of standing surface water, Lake Springfield, is located approximately five miles southeast of the airport. This reservoir, used for flood control, drinking water, and recreational purposes, is also the source of the city's municipal water supply.

SECTION 4.0 FIELD PROGRAM

This section describes the field activities conducted during the additional investigation for IRP Sites No. 1 and No. 2. The field investigation at the 183rd FW commenced on 10 December 1996 and was completed on 19 December 1996. The second round of groundwater samples and groundwater-level measurements, and the collection of the surface-water and sediment samples, were conducted from 1 April through 3 April 1997.

4.1 SUMMARY

The investigation at the 183rd FW incorporated the collection of groundwater samples and groundwater-level measurements at both IRP sites. The field investigation at IRP Site No. 2 also included:

- the installation of monitoring wells;
- the collection of soil samples for chemical and geotechnical analyses;
- the collection of sediment and surface-water samples for chemical analyses;
- conducting slug tests of newly installed monitoring wells; and
- surveying sampling locations and site topography.

A summary of the field investigations at IRP Sites No. 1 and No. 2 is presented in Table 4.1. The sampling locations for IRP Sites No. 1 and No. 2 are presented in Figures 4.1 and 4.2, respectively.

4.2 DEVIATIONS FROM THE WORK PLAN

There were six deviations from the Work Plan. However, in no way did any of the changed procedures or protocols affect accomplishing the overall objectives of the investigation. The deviations from the Work Plan and the rationale for the changes are described as follows:

- Both monitoring wells, MW-201B and MW-202B, were developed greater than 48 hours after well completion due to the base being closed for the weekend. MW-201B and MW-202B were completed on 12 and 13 December 1996, respectively. Both monitoring wells were developed on Monday, 16 December 1996.

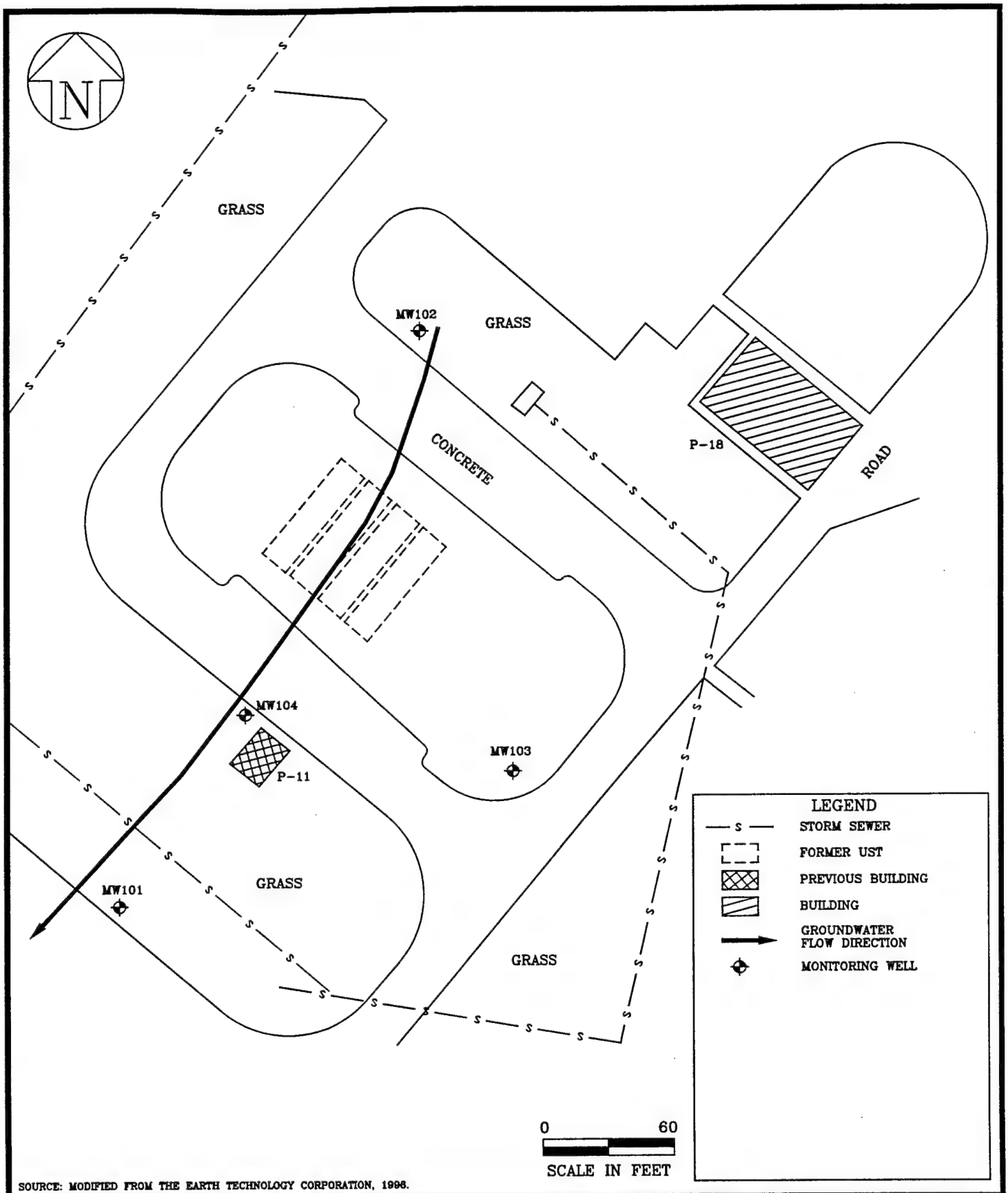
Table 4.1
Summary of the Field Investigation at IRP Sites No. 1 and No. 2
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

IRP Site No.	Sample Location Type	Type of Investigation	Analyses
1	MW101 MW102 MW103 MW104	· Collected two rounds of groundwater samples. · Collected two rounds of groundwater-level measurements.*	VOCs (USEPA Method SW846-8010/8020). PPMs (USEPA Method SW846-6010 and 7000 Series).
2	MW201 MW202 MW203	· Collected two rounds of groundwater samples. · Collected two rounds of groundwater-level measurements.	VOCs (USEPA Method SW846-8010/8020). PPMs (USEPA Method SW846-6010 and 7000 Series).
	MW201B MW202B	· Installed cluster monitoring wells and collected two rounds of groundwater samples and groundwater-level measurements from the new monitoring wells. · Collected soil sample every 5-foot interval for field GC screening. · Collected two surface-soil samples (0- to 6-inch interval) for chemical analyses. · Collected two soil samples from the vadose zone per borehole (monitoring well) for geotechnical analyses. · Performed slug tests on new monitoring wells.	VOCs (USEPA Method SW846-8010/8020). PPMs (USEPA Method SW846-6010 and 7000 Series). BTEX, Vinyl chloride, 1, 2-DCA, PCE and TCE. VOCs (USEPA Method SW846-8240). PPMs (USEPA Method SW846-6010 and 7000 Series). Organic carbon content, hydraulic conductivity, soil moisture content, dry soil bulk density, and grain-size analysis. Hydraulic conductivity.
	1st and 2nd Pond 2-SW/SD01 2-SW/SD02	· Collected one surface-water and sediment sample from each pond.	VOCs (USEPA Method SW846-8240). PPMs (USEPA Method SW846-6010 and 7000 Series).

ANG — Air National Guard.
VOCs — Volatile Organic Compounds.
1,2 DCA — 1,2 Dichloroethane.
BTEX — Benzene, toluene, ethylbenzene, xylene.
NA — Not applicable.
PCE — Tetrachloroethene.
MW — Monitoring Well.
PPM — Priority Pollutant Metals.
TCE — Trichlorethene.
USEPA — United Stated Environmental Protection Agency.
SW846 — Solid Waste Analytical Methods.
GC — Gas Chromatograph.
* Piezometer PZ104 could not be located during investigation due to restoration after removal of the USTs; thus, water-level measurements were not collected from this piezometer.

- The field gas chromatograph (GC) was not calibrated to screen for cis-1,2-DCE, as required in the Work Plan. Difficulties with the GC prevented proper calibration for this compound.

- The photograph of development water was inadvertently not taken. Clarity and turbidity measurements were recorded in the field log books.



SOURCE: MODIFIED FROM THE EARTH TECHNOLOGY CORPORATION, 1996.

FIGURE 4.1

ILLINOIS\TM-269\SITE1-A

GROUNDWATER SAMPLING LOCATIONS AT IRP SITE NO.1, POL STORAGE AREA

183rd FW, Illinois ANG
Springfield, Illinois

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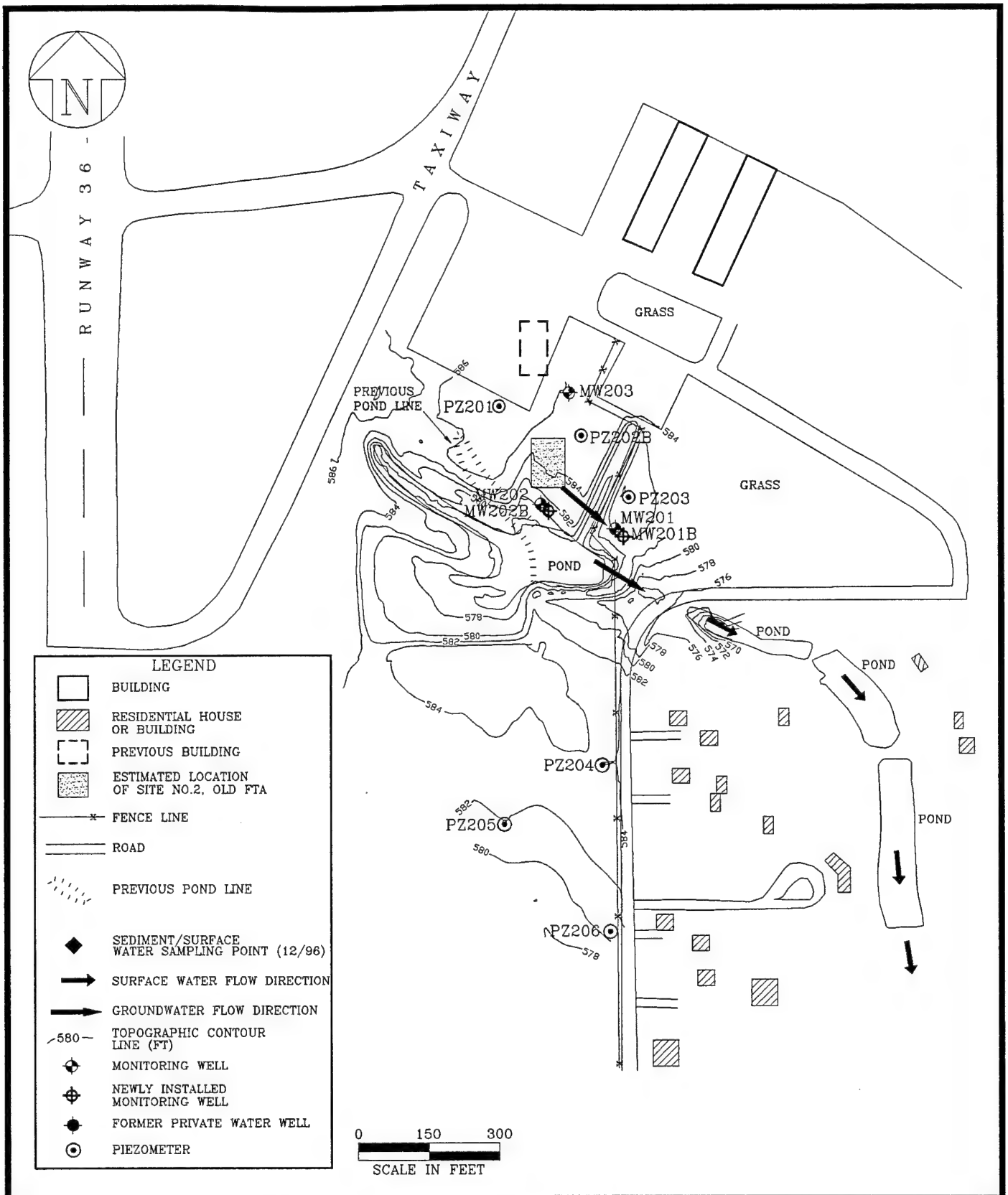

FIGURE 4.2

MONITORING WELL AND SEDIMENT/SURFACE WATER SAMPLING LOCATIONS AT IRP SITE NO.2, OLD FTA

183rd FW, Illinois ANG
Springfield, Illinois

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- During well development, disposable polyethylene bailers were used instead of a stainless-steel submersible pump because of the possibility of excessive drawdown due to the tightness of the formation.

- A certified mercury thermometer was not used to check the electronic digital thermometer because the water quality meter that was used was calibrated by the manufacturer. Mercury therometers break very easily in the field and the Horiba™ (water quality meter) has been very reliable during the past field efforts.

- During the first sampling round in December 1996, the vehicle used was running and positioned upwind, instead of downwind, during the purging and collecting of groundwater samples from monitoring wells MW201 and MW201B. This was done to provide a windbreak for the samplers from the -25° to -31° F wind chill that was in effect at the time of groundwater sampling and to provide a warm environment for the PID and water quality meter. No fuel-related compounds were found in the groundwater samples collected from these monitoring wells.

4.3 FIELD SCREENING ACTIVITIES

During drilling operations, a soil sample was collected at every 5-foot interval for field screening using a stainless-steel, split-spoon sampler. Immediately upon opening the split-spoon sampler, a Thermo Environmental OVM 580 photoionization detector (PID) was used to monitor for volatile organic vapors. All PID readings were reported on the boring logs included in Appendix B.

Soil samples were field screened using a Photovac 10S PLUS Portable GC. The field GC, calibrated to screen for BTEX, vinyl chloride, 1,2-dichloroethane (1,2-DCA), tetrachloroethene (PCE), and trichloroethene (TCE), was used to detect and quantify the presence of these compounds in the headspace from the soil samples collected. The field GC data is summarized in Section 5.0 and included in Appendix E.

4.4 FIELD ANALYTICAL ACTIVITIES

Hart Environmental Drilling, Inc., Chesterfield, Missouri, was contracted as the drilling contractor for installation of monitoring wells and collection of soil samples.

Nytest Environmental, Inc., Wichita, Kansas, was contracted to perform the chemical analyses. Provisions were made for proper sample containers with the appropriate preservation, labels, chain-of-custody forms, insulated sample shipping containers, and packing materials.
Hanson Engineering, Inc., Springfield, Illinois, was contracted to perform the geotechnical analyses. Provisions were made for proper sample containers, labels, chain-of-custody forms, and insulated sample shipping containers.

Boyer Engineering, Ltd., Springfield, Illinois, was retained as the surveying contractor. All new and existing monitoring wells, existing piezometers, and sediment and surface-water sampling locations at IRP Site No. 2 were surveyed to define their locations and elevations for future reference.

A site topography was also prepared for IRP Site No. 2. The topographic map includes the following information: site contours, surface drainage network, and surface water; location of other natural or cultural features; and an appropriate coordinate system and boundary locations. In conjunction with the coordinate system, the topographic map identifies the benchmarks and horizontal and vertical controls used for the survey. Cultural features consist of roads and transportation features, utility services such as water and sewer pipelines, telephone and electrical power lines, buildings, and other structures. The topographic map will be presented in the EE/CA.

The land surface and top of casing elevations of each monitoring well are presented on the well construction diagrams included in Appendix C.

4.4.1 Monitoring Well Installation

Monitoring wells were installed to identify the presence and extent of groundwater contamination to support the specific objectives of a non-time-critical removal action (i.e., where the release poses no immediate threat to public health, welfare, or the environment), supplementing existing data to the extent possible. Information gathered during the field investigation was used to provide data for an EE/CA, to obtain water-level data for hydrogeologic characterization of the unconsolidated glacial deposits, to interpret the horizontal potentiometric groundwater flow direction, to obtain groundwater samples for laboratory analyses, and to perform slug tests to determine the hydraulic conductivity of the unconsolidated glacial deposits.

Auger flights, drill rig(s), and tools were thoroughly steam-cleaned in the designated decontamination area near IRP Site No. 2 before initial use and after the completion of each monitoring well. Certified pre-cleaned and pre-wrapped riser and screen were used for monitoring well construction.

Two monitoring wells were installed using hollow-stem auger (HSA) methods, as described in Subsection 7.1.1.1 of the Work Plan (OpTech, 1997). Monitoring wells were drilled to auger refusal at bedrock, and screens set directly over the top of bedrock. Monitoring wells were constructed in accordance with Subsection 7.1.2 of the Work Plan, approved by ANG/CEVR and IEPA. Table 4.2 summarizes monitoring well construction data. Monitoring well construction diagrams are included in Appendix C.

Table 4.2
Monitoring Well Construction Summary Table
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

IRP Site No.	Monitoring Well ID Number	Manner of Completion	Depth Drilled (Feet BLS)	Screened Interval (Feet BLS)	Top of Sand Pack (Feet BLS)	Top of Bentonite Slurry Seal (Feet BLS)
2	MW-201B	Above Ground	26.5	16.0-26.0	14.0	10.0
	MW-202B	Above Ground	25.9	14.7-24.7	12.7	10.0

MW — Monitoring well. BLS — Below land surface.

The wells were developed between three and four days after well installation and completion. Monitoring wells were developed using new disposable polyethylene bailers. Monitoring well development continued until a minimum of three filter pack volumes of water were removed from each monitoring well, and specific conductance, temperature, and pH readings had stabilized in accordance with Subsection 7.1.2.1 of the Work Plan. After development, the wells were allowed to stabilize a minimum of 24 hours prior to sampling.

A rising-head slug test, to determine hydraulic conductivities, was conducted at each new monitoring well installed (MW-201B and MW-202B). The rising-head slug test was performed in accordance with Subsection 7.1.3 in the Work Plan. The resulting data were used to determine the hydraulic conductivities, and are presented in Appendix D.

Monitoring well coordinates and top-of-casing and land surface elevations were determined by a professional surveyor certified by the State of Illinois. The survey data are presented in Appendix F.

4.4.2 Specific Media Sampling

Soil, groundwater, surface-water, and sediment samples were collected for chemical analyses in accordance with Subsection 6.2.3 of the Work Plan; and soil samples were collected for geotechnical analyses in accordance with Subsection 6.2.4 of the Work Plan. Table 4.3 summarizes the analytical program at each IRP site.

Field duplicate samples, field blanks, MS/MSDs, equipment rinsate blanks, and trip blanks were submitted to the analytical laboratory for assessment of the quality of data resulting from the field sampling program. Field and trip blank samples were analyzed to check for procedural contamination and ambient conditions at the site that may have caused sample contamination. Duplicate samples were submitted to check the precision of laboratory data, as discussed in Subsection B.7.1.2 of the Work Plan. MS/MSD samples were used to check the accuracy of the laboratory data, as discussed in Subsection B.7.2 of the Work Plan.

4.5 INVESTIGATION DERIVED WASTE

During the investigation, waste material (drill cuttings, purge water, and miscellaneous derived wastes) were produced as a result of investigative activities. Drill cuttings were produced during the installation of monitoring wells. Drill cuttings were preliminarily characterized by monitoring for organic vapor emissions with a Thermo Environmental OVM 580 PID and screened with a Photovac 10S PLUS Portable GC. All soil cuttings were drummed in steel, plastic-lined 55-gallon drums at the time of drilling. Additionally, all well development and purge water from each well location was drummed separately.

Miscellaneous derived wastes (e.g., gloves, Visqueen™ sheeting, and wipes) which came in contact with drill cuttings having PID readings of less than 100 ppm were disposed of in a general refuse container. Miscellaneous derived wastes generated during the drilling of borings and/or wells which had PID readings in excess of 100 ppm were drummed in steel, plastic-lined 55-gallon drums.

All drums were properly marked to indicate their contents, the collection data, contractor's name and phone number, and borehole/well identification number. Guidance for the final disposition of drummed materials is provided in Appendix H of this technical memorandum.

Table 4.3
Laboratory Analyses Summary Table
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

IRP Site No.	Matrix	Field Parameters	Lab Parameters	Analytic Methods	Investigating Samples	Number of Field QA/QC Samples					Matrix Totals
						Trip Blanks	Equipment Rinsate Blanks	Field Blanks	Field Duplicate	MS/ MSD	
1	Groundwater	Temperature, pH, Specific Conductance	VOCs	SW8010/8020[a]	8[c]	1*[c]	1*	2*	—		10
			PPMs	SW6010[b]	8[c]		1*	2*	—		10
2	Soil	Chemical Analyses	VOCs	SW8240	2	1*[c]	1*	2*[d]	1	1	4
			PPMs	SW6010[b]							
		Geotechnical Analyses				—	—	—	—	—	
			f_o	ASTM Methods	4						4
			K		4						4
			M		4						4
			BD		4						4
			GS		4						4
	Sediment	Temperature, pH, Specific Conductance	VOCs	SW8240	2	1*[c]	1*	2*[d]	1	1	4
			PPMs	SW6010[b]	2		1*	2*[d]	1	1	4
	Surface Water	Temperature, pH, Specific Conductance	VOCs	SW8010/8020[a]	2	1*[c]	—	2*	1	1	4
			PPMs	SW6010[b]	2			2*	1	1	4
	Groundwater	Temperature, pH, Specific Conductance	VOCs	SW8010/8020[a]	10[e]	5*[c]	—	2*	2[e]	—	12[e]
			PPMs	SW6010[b]	10[e]			2*	2[e]		12[e]

* — Trip, Equipment Rinsate, and Field Blanks are not counted in Matrix Totals.
VOCs — Volatile Organic Compounds.
QA/QC — Quality Assurance/Quality Control.
PPMs — Priority Pollutant Metals.
MS/MSD — Matrix Spike/Matrix Spike Duplicate.
USEPA — United States Environmental Protection Agency.
[a]USEPA, 1986. Second column confirmation required.
[b]PPMs by USEPA Method SW6010 with the exception of arsenic (SW7060), cadmium (SW7131), chromium (SW7196), lead (SW7421), mercury (SW7470), selenium (SW7740), and thallium (SW7481).
[c]One Trip Blank per cooler.
[d]A field blank is collected from the potable water and de-ionized water sources per sampling event.
[e]Includes second round of groundwater sampling.
f_o — organic carbon content.
K — hydraulic conductivity.
M — moisture content.
BD — dry bulk density.
GS — grain-size analyses.
ASTM — American Society of Testing Materials.
"—" — Not Analyzed.

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SECTION 5.0 INVESTIGATION FINDINGS

This section presents the investigation results of the field activities that were conducted at IRP Sites No. 1 and No. 2. A comprehensive discussion of the investigation results of the SI fieldwork conducted in 1992-93, the SI Addendum conducted in 1994, and this investigation will be included in this section. Investigation results for IRP Sites No. 1 and No. 2 are evaluated in the following sections utilizing the IEPA's Tiered Approach to Cleanup Objectives Guidance Document (IEPA, 1996). The analytical results for soil and sediment samples were compared with the IEPA risk-based soil cleanup objectives for industrial/commercial properties (Tier 1, Title 35, Part 742, IEPA, 1996). The analytical results for metals in soil and sediment samples were also compared with the IEPA range of concentrations of inorganic chemicals in background soil (Table F, Section 742, Appendix A, IEPA, 1996). The analytical results for groundwater samples were compared with the IEPA risk-based groundwater cleanup objectives for Class I groundwater (Tier 1, Title 35, Part 742, IEPA, 1996).

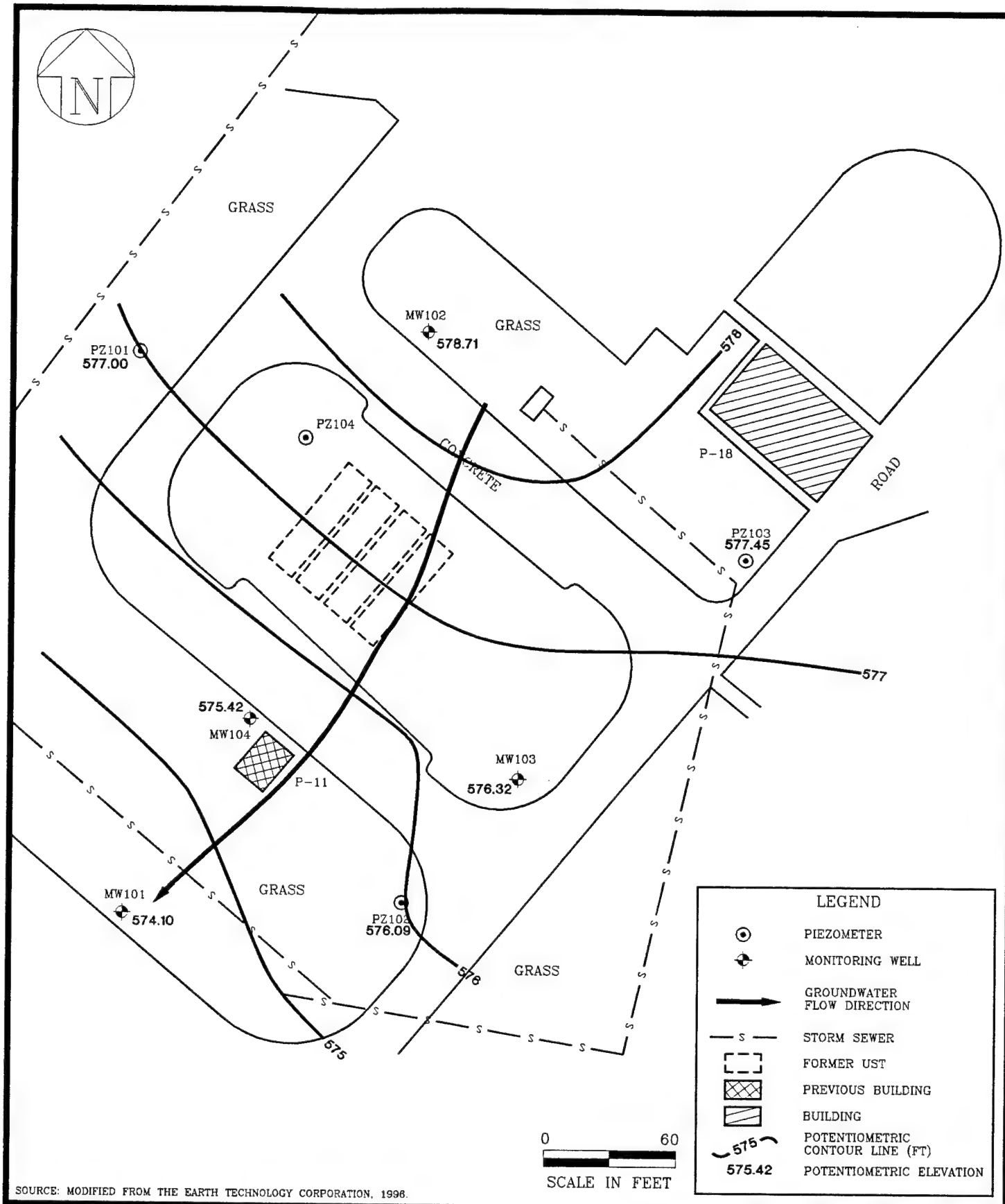
5.1 IRP SITE NO. 1 — PETROLEUM, OILS, AND LUBRICANTS STORAGE AREA

The field activities that were conducted during this investigation included collection of two rounds of groundwater samples from all existing monitoring wells and water-level data from all existing piezometers and monitoring wells. Piezometer PZ104 could not be located during this investigation due to restoration after removal of the USTs; thus, water-level measurements were not collected from this piezometer. The hydrogeologic investigation and analytical results are presented in Subsections 5.1.1 and 5.1.2. The investigation results from the SI and this investigation are summarized in Subsection 5.1.3.

5.1.1 Hydrogeologic Investigation Results

The groundwater occurs at shallow depths within the unconsolidated glacial deposits overlying the bedrock. Based on previous investigations, the average conductivity at the site is 1.35×10^{-4} cm/sec, while average groundwater velocity and aquifer transmissivity are 4.32 feet per year and 0.0823 square centimeters per second (cm^2/sec), respectively (TETC, 1996).

Potentiometric surface contour maps, constructed from water-level data collected on 18 December 1996 and 1 April 1997, are shown on Figures 5.1 and 5.2, respectively. The groundwater altitude data are presented in Table 5.1. The direction of groundwater movement is to the southwest with an average hydraulic gradient of 0.018 feet/foot (Figures 5.1 and 5.2).



SOURCE: MODIFIED FROM THE EARTH TECHNOLOGY CORPORATION, 1996.

FIGURE 5.1

ILLINOIS\TM-269\SITE1

POTENTIOMETRIC SURFACE MAP, 18 DEC 1996, AT IRP SITE NO.1, POL STORAGE AREA
183rd FW, Illinois ANG
Springfield, Illinois

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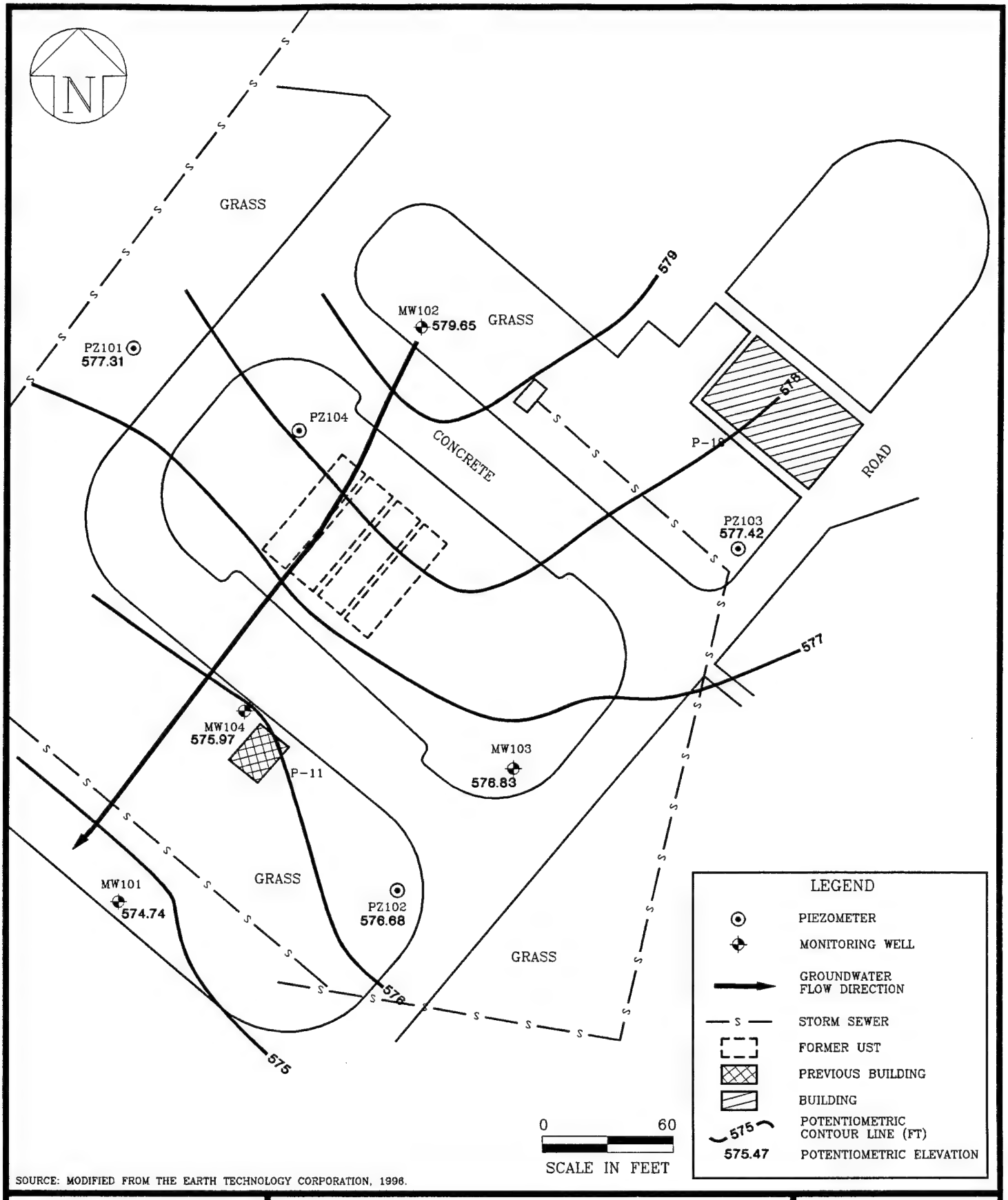

SOURCE: MODIFIED FROM THE EARTH TECHNOLOGY CORPORATION, 1996.

FIGURE 5.2

ILLINOIS\TM-269\SITE1

POTENTIOMETRIC SURFACE MAP, 1 APRIL 1997, AT IRP SITE NO.1, POL STORAGE AREA

183rd FW, Illinois ANG
Springfield, Illinois

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Table 5.1
Groundwater Elevation Data for IRP Site No. 1
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

MW/PZ ID	TOC Elevation (feet)	Water-Level (feet BTOC) 12/18/96	Water-Level Elevation (feet) 12/18/96	Water-Level (feet BTOC) 4/1/97	Water-Level Elevation (feet) 4/1/97
MW101	582.77	8.67	574.10	8.03	574.74
MW102	583.53	4.82	578.71	3.88	579.65
MW103	584.04	7.42	576.32	7.21	576.83
MW104	583.15	7.73	575.42	7.18	575.97
PZ101	583.47	6.47	577.00	6.16	577.31
PZ102	584.35	8.26	576.09	7.67	576.68
PZ103	583.50	6.05	577.45	6.08	577.42

MW — Monitoring Well.
TOC — Top of Casing.
BTOC — Below Top of Casing.
PZ — Piezometer.
ID — Identification.

5.1.2 Analytical Results

Two rounds of groundwater samples were collected from all existing monitoring wells at IRP Site No. 1. The groundwater samples were analyzed for VOCs and priority pollutant metals (PPM) (Table 4.1). The analytes that were detected in the groundwater samples are presented in Tables 5.2 and 5.3 for the sampling rounds. The analytical data, laboratory reports, and chain-of-custody forms are presented in Appendix J, Field Analytical Data. The QA/QC data evaluation of this data is presented in Appendix I, Quality Assurance/Quality Control Data Evaluation.

Table 5.2
Analytes Detected in Groundwater Samples Collected
in December 1996 from IRP Site No. 1
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

Analyte	ARARs	MW101	MW102	MW103	MW104
VOCs (µg/L)					
Ethylbenzene	700	1.0 U	1.0 U	1.0 U	3.1
Xylenes (total)	10,000	1.0 U	1.0 U	1.0 U	1.4
PPMs (µg/L)					
Arsenic	50	27	10 U	10 U	**72**
Copper	650	32	25 U	25 U	25 U
Lead	7.5	**19**	4.0 U	**16**	**10**
Zinc	5,000	49	35	61	23

MW — Monitoring Well.
VOCs — Volatile Organic Compounds.
PPMs — Priority Pollutant Metals.
µg/L — micrograms per liter.
U — Analyte analyzed but not detected.
ARARs — Applicable or Relevant and Appropriate Requirements.
Bold — Concentrations of analytes that exceeded the IEPA risk-based groundwater cleanup Objectives for Class I groundwater (IEPA, 1996).

Table 5.3
Analytes Detected in Groundwater Samples Collected in April 1997 from IRP Site No. 1
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

Analyte	ARARs	MW101	MW102	MW103	MW104
VOCs (µg/L)					
Xylenes (total)	10,000	1.0 U	1.0 U	1.0 U	1.1
PPMs (µg/L)					
Arsenic	50	26	10 U	10 U	**68**
Copper	650	25 U	25 U	32	25 U
Lead	7.5	**12**	6.8	**10**	**12**
Zinc	5,000	39	33	26	33

MW — Monitoring Well.
VOCs — Volatile Organic Compounds.
PPMs — Priority Pollutant Metals.
µg/L —micrograms per liter.
U — Analyte analyzed but not detected.
ARARs — Applicable or Relevant and Appropriate Requirements.
Bold — Concentrations of analytes that exceeded the IEPA risk-based groundwater cleanup Objectives for Class I groundwater (IEPA, 1996).

VOCs ethylbenzene and total xylenes were present in the groundwater samples collected from MW104 during the December 1996 sampling round at levels below the IEPA Tier I objective for Class I groundwater (Table 5.2). Only xylenes (total) were found in the groundwater sample collected in April 1997 at a concentration less than the IEPA Tier 1 objective for Class I groundwater (Table 5.3).

Arsenic was only present in the groundwater samples collected from monitoring well MW104 during both sampling rounds at concentrations slightly exceeding the IEPA Tier I objective for Class I groundwater (Tables 5.2 and 5.3). Arsenic was found in the groundwater samples collected from monitoring well MW101, downgradient from MW104, at levels below the IEPA objective for Class I groundwater. Lead was present in groundwater samples collected from monitoring wells MW101, MW103, and MW104 during both sampling rounds at concentrations slightly exceeding the IEPA Tier I objective for Class I groundwater (Tables 5.2 and 5.3).

5.1.3 Summary of the Investigation Results

Fuel-related compounds were present in soil samples at levels below the IEPA risk-based soil cleanup objectives for industrial and commercial properties (IEPA, Title 35, Part 742). Metals were found in soil samples within the normal range of concentrations in local soils (IEPA, Section 742, Appendix A).

Fuel-related compounds were present in the groundwater samples collected from monitoring well MW104 at concentrations below the IEPA risk-based groundwater cleanup objective for Class I

groundwater (IEPA, Title 35, Part 742, Tier I). Monitoring well MW104 is located directly downgradient from the former USTs (Figures 5.1 and 5.2). Fuel-related compounds were not present in the groundwater samples collected from monitoring well MW101, which is located downgradient from monitoring well MW104.

Arsenic and lead were present in groundwater samples at levels slightly exceeding the IEPA risk-based objectives for Class I groundwater; however, the groundwater is not used for drinking. These levels were below the IEPA risk-based objectives for Class II groundwater. Although lead was found in subsurface soil samples collected during the initial site investigation conducted in 1992, the concentrations were within the normal range for local soil. Thus, this metal was derived from the geologic material. Arsenic and lead are not a result of site-related activities; therefore, these metals are not contaminants of concern.

5.2 IRP SITE NO. 2 — OLD FIRE TRAINING AREA

The field activities that were conducted during this investigation included installation of cluster monitoring wells, collection of soil samples for chemical and geotechnical analyses, collection of two rounds of groundwater samples from all existing and newly installed monitoring wells, conducting slug tests, and collection of water-level data from all existing piezometers and monitoring wells. The hydrogeologic investigation and analytical results are presented in Subsections 5.2.1 and 5.2.2. The investigation results from the SI, SI Addendum, and this investigation are summarized in Subsection 5.2.3.

5.2.1 Hydrogeologic Investigation Results

Groundwater occurs at shallow depths within the unconsolidated glacial deposits overlying the bedrock. Based on boring logs of monitoring well MW201B and MW202B, the unconsolidated glacial material consists of reworked loess (silt deposited by wind) that is approximately 15 feet thick overlying a glacial till deposit (a combination of silt, clay, sand, and gravel deposited directly by the glacier) that is approximately 10 feet thick. The total thickness of the unconsolidated glacial material overlying the bedrock is 25 feet. Based on previous investigations, the average conductivity at the site is 1.73×10^{-4} cm/sec, while average groundwater velocity and aquifer transmissivity are 5.66 feet per year and 0.155 cm^2/sec, respectively (TETC, 1996). The monitoring wells that were installed during the previous investigations were screened within the reworked loess; thus, the hydraulic conductivities, average groundwater velocity, and aquifer transmissivity were representative of the screened hydrologic unit.

Potentiometric surface contour maps, constructed from water-level data collected on 18 December 1996 and 1 April 1997, are shown on Figures 5.3 and 5.4, respectively. The groundwater altitude data are presented in Table 5.4. Based on the potentiometric surface map intrepretation from the water-level data collected in December 1996, the general direction of groundwater movement is to the southeast with average hydraulic gradients of 0.017 feet/foot (north of the pond), 0.05 feet/foot (east of the pond), and 0.02 feet/foot (south of the pond) (Figure 5.3).

The direction of groundwater movement from the Old FTA appears to be away from the pond in December 1996, whereas the direction of groundwater movement is towards the pond in April 1997. Based on the potentiometric surface map of April 1997, a groundwater mound is apparent at PZ204, creating a localize change in flow direction. Due to snow melt and extreme increased precipitation in the spring, groundwater levels were higher in elevation in April 1997 than in December 1996. Due to the increase of water into the hydrologic unit and the influence of the drainage in the area, the potentiometric maps for December 1996 and April 1997 are different. The direction of groundwater movement from the FTA is towards the southeast with an average hydraulic gradient of 0.019 feet/foot (Figure 5.4). The groundwater mound located north of the FTA mimics the topography (Figures 4.2 and 5.4). The direction of groundwater movement appears to radiate from piezometer PZ104 with an average hydraulic gradient of 0.007 feet/foot. The groundwater mound located south of the pond may result from the increased water to the hydrologic unit through a reported subsurface drainage system in the area. Drainage tiles are ubiquitous in central Illinois farmland.

Slug tests were conducted on monitoring wells MW201B and MW202B in December 1996. The average hydraulic conductivity for MW201B and MW202B is 1.50×10^{-3} cm/sec (4.24 feet/day). The average hydraulic conductivity of monitoring wells MW201, MW202, and MW203 is 1.73×10^{-4} cm/sec (TETC, 1996). Monitoring wells MW201B and MW 202B are screened in the till that directly overlies the bedrock; whereas, monitoring wells MW201, MW202, and MW203 were screened in the reworked loess that overlies the till. The direction of the vertical hydraulic gradient between the clustered monitoring wells (MW201 and MW201B, and MW202 and MW202B) is a downward movement (Table 5.4). The downward movement of the groundwater may be a result of the more permeable till and the variability of the texture within the hydrologic unit. The slug test data analysis is presented in Appendix D, Aquifer Slug Test Data Analysis.

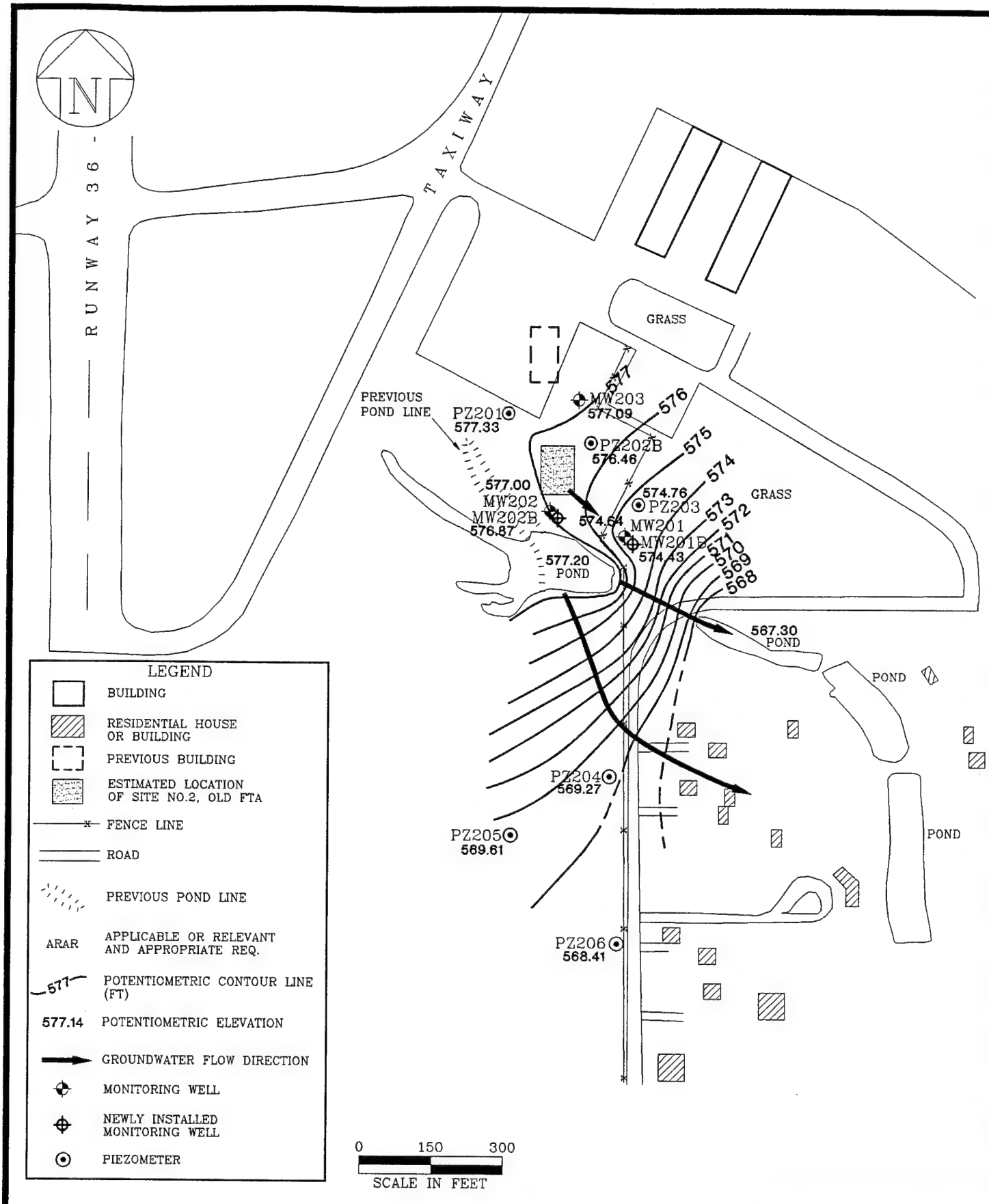

FIGURE 5.3

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POTENTIOMETRIC SURFACE MAP, 18 DECEMBER 1996, AT IRP SITE NO.2, OLD FTA

183rd FW, Illinois ANG
Springfield, Illinois

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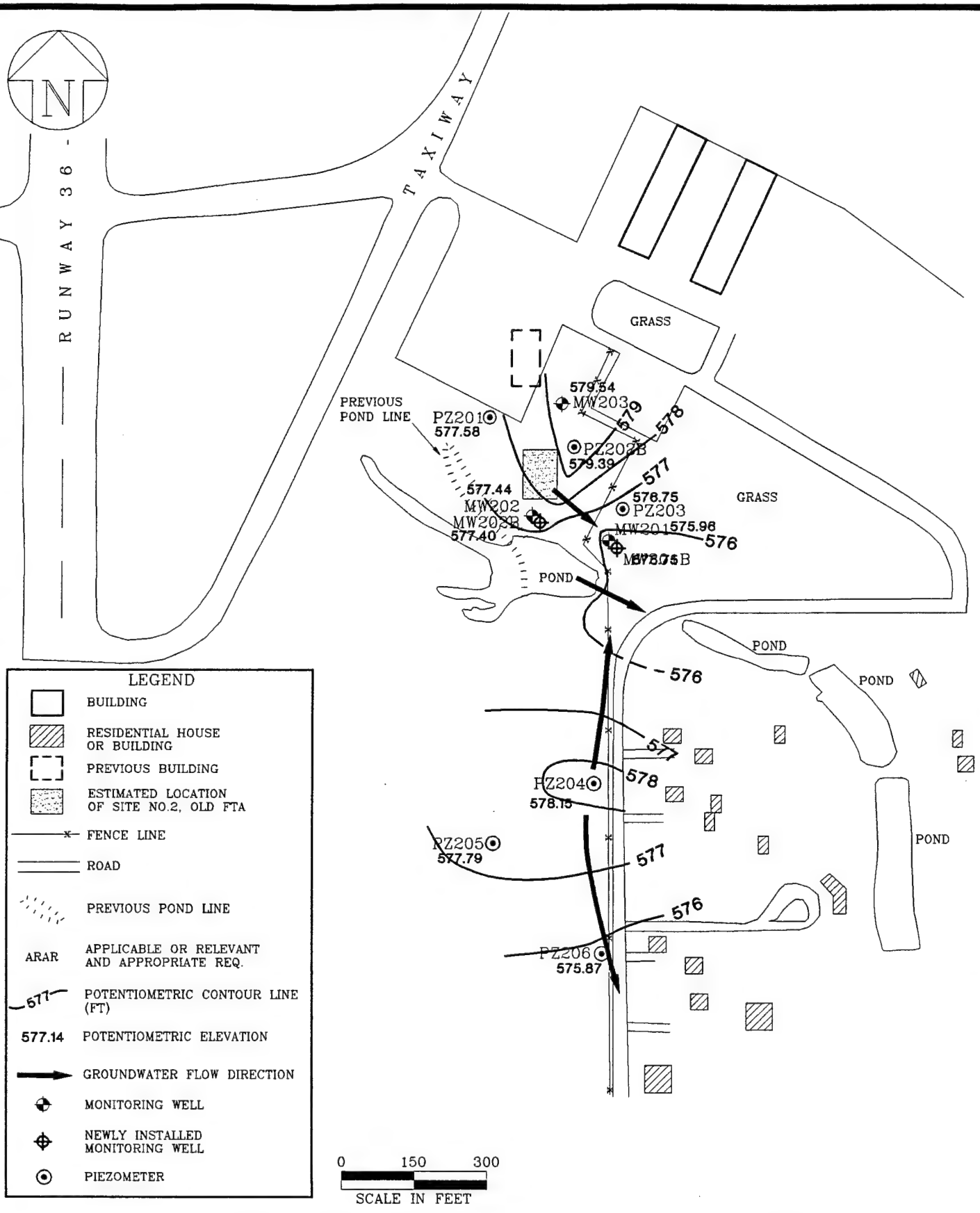

FIGURE 5.4

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POTENTIOMETRIC SURFACE MAP, 1 APRIL 1997, AT IRP SITE NO.2, OLD FTA

183rd FW, Illinois ANG
Springfield, Illinois

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Table 5.4
Groundwater Elevation Data for IRP Site No. 2
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

MW/PZ ID	TOC Elevation (feet)	Water-Level (feet BTOC) 12/18/96	Water-Level Elevation (feet) 12/18/96	Water-Level (feet BTOC) 4/1/97	Water-Level Elevation (feet) 4/1/97
MW201	586.77	12.13	574.64	10.81	575.96
MW201B	587.21	12.78	574.43	11.46	575.75
MW202	583.12	6.12	577.00	5.68	577.44
MW202B	583.65	6.78	576.87	6.25	577.40
MW203	588.07	10.98	577.09	8.53	579.54
PZ201	586.34	9.01	577.33	8.76	577.58
PZ202	585.00	8.54	576.46	5.61	579.39
PZ203	585.14	10.38	574.76	8.39	576.75
PZ204	586.20	16.93	569.27	8.05	578.15
PZ205	584.43	14.82	569.61	6.64	577.79
PZ206	583.50	15.09	568.41	7.63	575.87
2-SW01	N/A	N/A	577.22	N/A	NM
2-SW02	N/A	N/A	567.33	N/A	NM

MW — Monitoring Well.
TOC — Top of Casing.
BTOC — Below Top of Casing.
PZ — Piezometer.
ID — Identification.
N/A — Not Applicable.
NM — Not Measured.

5.2.2 Analytical Results

Soil samples were collected for geotechnical analyses. The results of the geotechnical analyses are presented in Appendix F, Geotechnical Results. The results of the geotechnical analyses will be used in the risk evaluation for the EE/CA. Surface-soil, sediment, surface-water, and groundwater samples were collected for VOC and PPM analyses (Table 4.1). The analytical results for surface-soil and sediment samples are presented in Tables 5.5 and 5.6, respectively. The analytes that were detected in the groundwater samples are presented in Tables 5.7 and 5.8 for the two sampling rounds, respectively. The analytical data, laboratory reports, and chain-of-custody forms are presented in Appendix J, Field Analytical Data. The QA/QC data evaluation is presented in Appendix I, Quality Assurance/Quality Control Data Evaluation.

Methylene chloride was present in surface-soil samples collected from both MW201B and MW202B locations at a concentration of 16 µg/kg, below the IEPA soil cleanup objective for industrial and commercial sites (Table 5.5). Chromium, copper, lead, nickel, and zinc were detected in both surface-soil samples at concentrations within the range for background soils and less than the IEPA risk-based soil cleanup objectives (Table 5.5).

Table 5.5
Analytes Detected in Surface-Soil Samples
Collected from IRP Site No. 2
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

Analyte	ARAR	MW201B	MW202B
VOCs (µg/kg)			
Methylene Chloride	85,000	16	16
PPMs (mg/kg)			
Chromium	390	11	8.6
Copper	2,900	26	11
Lead	400	53	12
Nickel	1,600	14	10
Zinc	23,000	63	38

mg/kg — milligrams per kilogram.
MW — Monitoring Well.
PPMs — Priority Pollutant Metals.
VOCs — Volatile Organic Compounds.
ARARs — Applicable or Relevant and Appropriate Requirements.
µg/kg — micrograms per kilogram.
ARARs — IEPA risk-based soil cleanup objectives for industrial/commercial properties (Ingestion route) (IEPA, 1996)

Table 5.6
Analytes Detected in Sediment Samples
Collected from IRP Site No. 2
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

Analyte	ARAR	2-SD01	2-SD02
VOCs (µg/L)			
No VOCs were detected in the sediment samples.			
PPMs (mg/kg)			
Chromium	390	4.2	3.5
Copper	2,900	8.8	5.5
Lead	400	11	7.0 U
Nickel	1,600	6.3	4.0 U
Zinc	23,000	26	22

mg/kg — milligrams per kilogram.
MW — Monitoring Well.
PPMs — Priority Pollutant Metals.
VOCs — Volatile Organic Compounds.
ARARs — Applicable or Relevant and Appropriate Requirements.
µg/kg — micrograms per kilogram.
U — Analyte analyzed but not detected.
ARARs — IEPA risk-based soil cleanup objectives for industrial/commercial properties (Ingestion route) (IEPA, 1996)

No VOCs were found in the sediment and surface-water samples collected from the first and second ponds. Chromium, copper, lead, nickel, and zinc were present in the sediment samples at concentrations within the range for background soils and less than the IEPA risk-based soil cleanup objectives (Table 5.6). Lead was present in the surface-water samples collected from locations 2-SW01 and 2-SW02 at concentrations of 9.5 µg/L and 7.3 µg/L, respectively. No IEPA ARARs exist for surface water.

Table 5.7
Analytes Detected in Groundwater Samples Collected in December 1996 from IRP Site No. 2
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

Analyte	ARARs	MW201	MW201B	MW202	MW202B	MW203
VOCs (µg/L)						
1,2-Dichloroethane	5	1.0 U	1.0 U	1.0 U	2.7	1.0 U
Benzene	5	0.5 U	0.5 U	0.8	1.3	0.5 U
cis-1,2,-Dichloroethene	70	1.0 U	8.3	2.7	**120**	1.0 U
Ethylbenzene	700	1.0 U	1.0 U	2.3	1.5	1.0 U
trans-1,2-Dichloroethene	100	1.0 U	1.0 U	1.0 U	1.2	1.0 U
Trichloroethene	5	1.0 U	1.0 U	1.0 U	2.6	1.0 U
Vinyl Chloride	**2**	1.0 U	1.0 U	**4.6**	**60**	1.0 U
Xylenes (total)	10,000	1.0 U	1.0 U	1.1	1.0 U	1.0 U
PPMs (µg/L)						
Arsenic	50	10 U	10 U	10 U	11	10 U
Chromium	100	30 U	58	30 U	37	30 U
Copper	650	27	75	25 U	58	25 U
Lead	7.5	**17**	**35**	**10**	**28**	**9.6**
Nickel	100	40 U	63	40 U	53	40 U
Zinc	5,000	65	230	45	170	59

VOCs — Volatile Organic Compounds. ARARs — Applicable or Relevant and Appropriate Requirements.
MW — Monitoring Well. µg/L — micrograms per liter.
PPMs — Priority Pollutant Metals. U — Analyte analyzed but not detected.
Bold — Concentrations of Analytes that exceeded IEPA risk-based objectives (IEPA, 1996)
ARARs — IEPA risk-based groundwater cleanup objectives for Class I groundwater (IEPA, 1996)

Concentrations of the analytes detected in the groundwater samples are presented in Tables 5.7 and 5.8 for each sampling round. The analytes detected at concentrations exceeding the ARARs are presented on Figure 5.5. Cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride were found in the groundwater samples collected from monitoring well MW202B during both sampling rounds at concentrations exceeding the IEPA risk-based objectives for Class I groundwater (Tables 5.7 and 5.8, and Figure 5.5). Vinyl chloride was present in groundwater samples collected from monitoring well MW202 at concentrations exceeding the IEPA risk-based objective for Class I groundwater. Lead was present in groundwater samples collected from all monitoring wells during both sampling rounds at concentrations exceeding the IEPA risk-based objective for Class I groundwater (Tables 5.7 and 5.8, and Figure 5.5). All groundwater samples collected for metals were unfiltered during the first sampling round. During the second sampling round, two groundwater samples for metals were submitted to the laboratory from MW202 (one filtered, one unfiltered) for comparison purposes. Lead was not found in the filtered groundwater sample; thus, the lead found in the unfiltered samples are associated with the fine particles in the groundwater. Manganese was not analyzed in the first sampling round because it is not a priority pollutant metal, but it was added for the second sampling round due to its existence in previous

Table 5.8
Analytes Detected in Groundwater Samples Collected in April 1997 from IRP Site No. 2
183rd Fighter Wing, Illinois ANG, Springfield, Illinois

Analyte	ARAR	MW201	MW201B	MW202 Unfiltered	MW202 Filtered	M202B	MW203
VOCs (µg/L)							
1,2-Dichloroethane	5	1.0 U	1.0 U	N/A	1.0 U	3.1	1.0 U
Benzene	5	0.5 U	.05 U	N/A	0.6	0.9	0.5 U
cis-1,2,-Dichloroethene	70	1.0	19	N/A	5.8	**130**	1.0 U
Chloroethane	N/A	1.0 U	1.0 U	N/A	1.6	1.0 U	1.0 U
trans-1,2-Dichloroethene	100	1.0 U	1.0 U	N/A	1.0 U	1.8	1.0 U
Trichloroethene	5	1.0 U	2.7	N/A	1.0 U	3.5	1.0 U
Vinyl Chloride	2	1.0 U	1.0 U	N/A	**9.5**	**50**	1.0 U
PPMS (µg/L)							
Arsenic	50	10 U	10 U	10 U	10 U	12	10 U
Chromium	100	30 U	30 U	30 U	30 U	34	30 U
Copper	650	25 U	45	25 U	25 U	56	25 U
Lead	7.5	**15**	**26**	**11**	4.0 U	**29**	**12**
Manganese	150	**160**	**830**	**940**	**920**	**1.400**	57
Nickel	100	40 U	40 U	40 U	40 U	42	40 U
Zinc	5,000	30	120	20 U	20 U	180	20

VOCs — Volatile Organic Compounds.
MW — Monitoring Well.
PPMs — Priority Pollutant Metals.
U — Analyte analyzed but not detected.
Bold — Concentrations of Analytes that exceeded IEPA risk-based objectives (IEPA, 1996)
ARARs — IEPA risk-based groundwater cleanup objectives for Class I groundwater (IEPA, 1996)

ARARs — Applicable or Relevant and Appropriate Requirements.
µg/L — micrograms per liter.
N/A — Not Applicable.

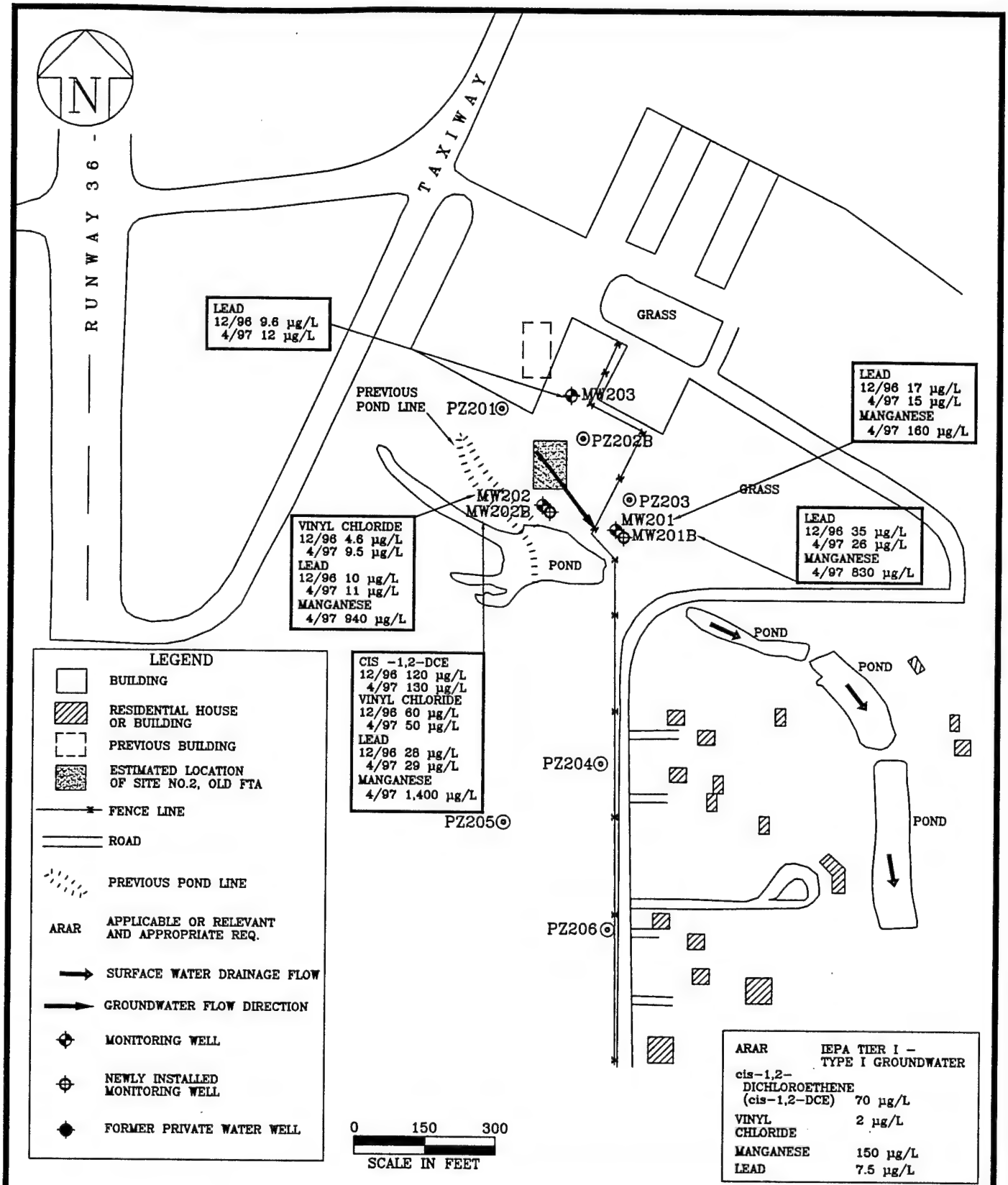

FIGURE 5.5

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ANALYTES DETECTED IN GROUNDWATER SAMPLES EXCEEDING ARARs AT IRP SITE NO.2, OLD FTA

183rd FW, Illinois ANG
Springfield, Illinois

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investigations (Table 5.8). Manganese was found in filtered and unfiltered groundwater samples collected from monitoring wells MW201, MW201B, MW202, and MW202B at concentrations exceeding the IEPA objective for Class I groundwater (Table 5.8 and Figure 5.5). However, based on field observations of the subsurface geologic materials, and a conversation with City Water and Power personnel in Springfield, Illinois, these levels of manganese are naturally occurring in groundwater in the Sangamon River Valley with a maximun concentration of 1,600 µg/L (personal communication with Luepke, M., 1997). Manganese was found in groundwater samples collected from monitoring wells MW201, MW202, and MW203 in August 1994 at levels exceeding the IEPA cleanup criteria objective for Class I groundwater (Figure 2.4). The groundwater sample collected from the upgradient monitoring well MW203 has a concentration of 1,230 µg/L. Lead and manganese were not found at concentrations exceeding the IEPA risk-based objective for Class II groundwater. Lead was present in subsurface-soil samples collected from previous investigations at concentrations (13.5-23.8 mg/kg) within the range for background soils (<7.44-270 mg/kg) (IEPA, 1996). Manganese was present in subsurface-soil samples at concentrations (150-9,898 mg/kg) exceeding the range for background soils (61.5-3,710 mg/kg) (IEPA, 1996).

5.2.3 Summary of the Investigation Results

Vinyl chloride and cis-1,2-DCE were found at concentrations exceeding the IEPA ARARs in groundwater samples collected from the clustered monitoring wells (MW202 and MW202B) located directly downgradient from the FTA (Figure 5.5). Site-related compounds were not found exceeding IEPA ARARs in groundwater samples collected from the clustered monitoring wells (MW201 and MW201B) located approximately downgradient to cross-gradient from MW202. No site-related compounds were found in the surface-water and sediment samples collected from either the first or second ponds. The first and second ponds are located downgradient from monitoring wells MW202 and MW202B.

Although manganese was found at concentrations exceeding the IEPA ARARs in filtered and unfiltered groundwater samples, these levels are naturally occurring in the groundwater and geologic material in the area. Lead was found at concentrations exceeding the IEPA ARARs in unfiltered groundwater samples; however, this metal was derived from the unconsolidated glacial material and is also not a result of site-related activities. Manganese and lead are not a result of site-related activities; therefore, these metals are not contaminants of concern.

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SECTION 6.0 CONCLUSIONS

This section provides the conclusions based on all investigation for IRP Sites No. 1 and No. 2. The conclusions for IRP Sites No. 1 and No. 2 are presented in Sections 6.1 and 6.2, respectively.

6.1 IRP SITE NO. 1 — PETROLEUM, OILS, AND LUBRICANTS STORAGE AREA

The conclusions for IRP Site No. 1 are as follows:

- Fuel-related compounds were present in soil samples at levels below the IEPA risk-based soil cleanup objectives for industrial and commercial properties (IEPA, Title 35, Part 742). Metals were present in soil samples within the normal range of concentrations in local soils (IEPA, Section 742, Appendix A).

- Fuel-related compounds were present in the groundwater samples collected from monitoring well MW104 at concentrations below the IEPA risk-based groundwater cleanup objective for Class I groundwater (IEPA, Title 35, Part 742, Tier I). Monitoring well MW104 is located directly downgradient (or "downstream") from the former USTs (Figures 5.1 and 5.2). Fuel-related compounds were not present in the groundwater samples collected from monitoring well MW101 which is located downgradient from monitoring well MW104.

6.2 IRP SITE NO. 2 — OLD FIRE TRAINING AREA

The conclusions for IRP Site No. 2 are as follows:

- Vinyl chloride and cis-1,2-DCE were found at concentrations exceeding the IEPA risk-based groundwater cleanup objectives for Class I groundwater in groundwater samples collected from the clustered monitoring wells (MW202 and MW202B) located directly downgradient from the FTA (Figure 5.5).

- No site-related compounds were found exceeding the IEPA risk-based groundwater cleanup objectives for Class I groundwater in groundwater samples collected from the clustered monitoring wells (MW201 and MW201B) located approximately downgradient from MW202.

- No site-related compounds were found in the surface-water and sediment samples collected from the first and second ponds. The first and second ponds are located downgradient from monitoring wells MW202 and MW202B.

SECTION 7.0 RECOMMENDATIONS

This section presents the recommendations based on all investigations for IRP Sites No. 1 and No. 2. The recommendations for IRP Sites No. 1 and No. 2 are presented in Sections 7.1 and 7.2, respectively.

7.1 IRP SITE NO. 1 — PETROLEUM, OILS, AND LUBRICANTS STORAGE AREA

The recommendation for IRP Site No. 1 is as follows:

- No additional investigation is warranted at the site. It is recommended that a no further action Decision Document be prepared for IRP Site No. 1.

7.2 IRP SITE NO. 2 — OLD FIRE TRAINING AREA

The recommendation for IRP Site No. 2 is as follows:

- It is recommended that an Engineering Evaluation/Cost Analysis be conducted for the site. The resulting risk-based evaluation will determine the necessity for a removal action at IRP Site No. 2 based on environmental conditions.

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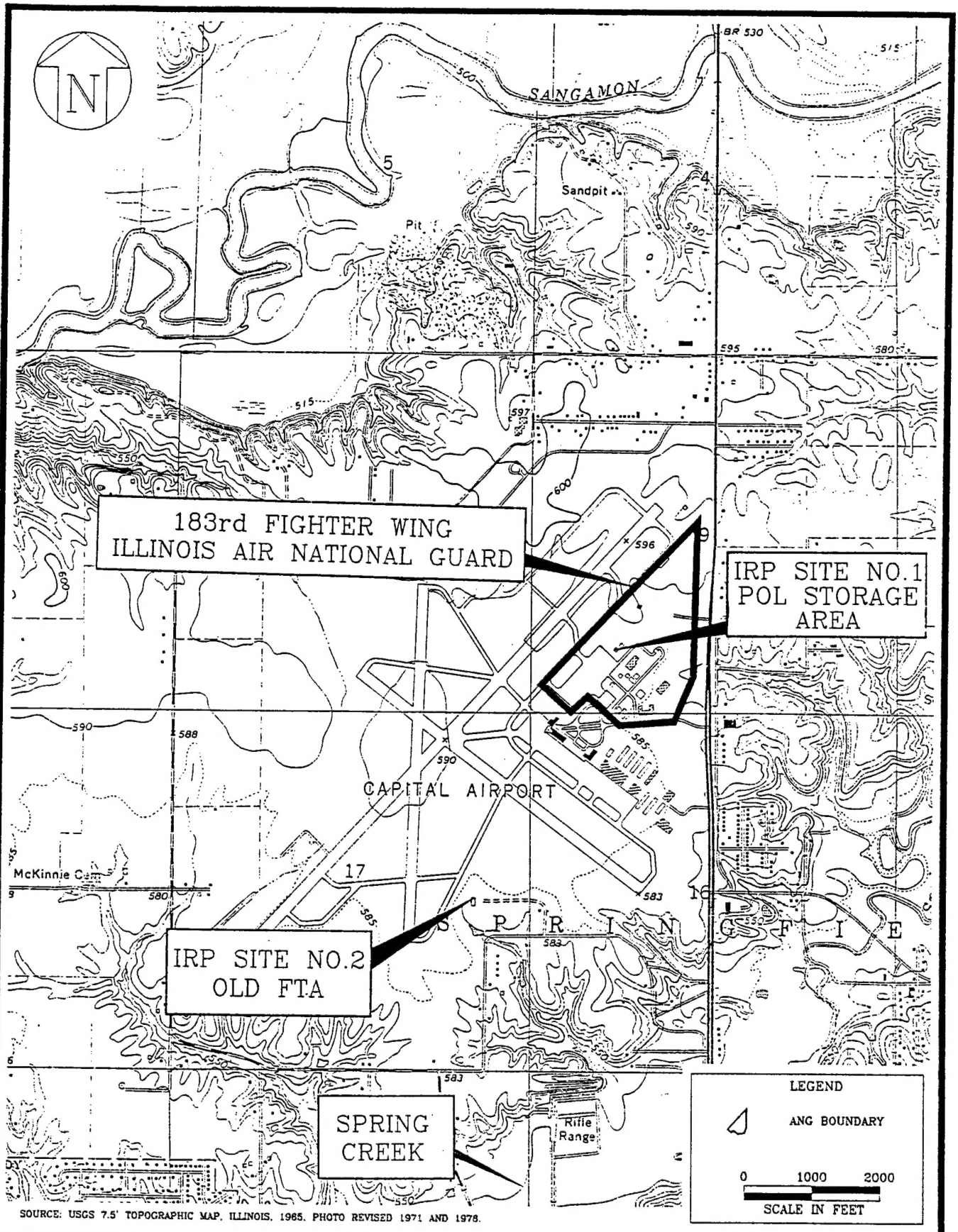

SOURCE: USGS 7.5' TOPOGRAPHIC MAP, ILLINOIS, 1965, PHOTO REVISED 1971 AND 1978.

INSIDE BACK COVER

ILLINOIS\TOPO

SITE LOCATION MAP

183rd FW, Illinois ANG

Springfield, Illinois

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